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ABSTRACT

The two-fold role of the content area secondary school teacher in teaching content and in teaching learning process is investigated. A research model, called the Structured Overview, showing the relationships among basic elements of the study of the secondary school curriculum is presented, and assumptions clarifying the perspective of the nature and purpose of reading instruction in the content areas used in this research are listed. From this comprehensive research model, several areas were selected for short term iterative studies which are reported in this monograph. In Section One, Comprehension, a theoretical construct of levels of comprehension and the development of an evaluative instrument for this construct are explicated. In Section Two, Lesson Structure, a theoretical paper on the Structured Overview, entitled "The Use of Vocabulary as an Advanced Organizer," is followed by practical application of the Structured Overview model to biology, English, Mathematics, and earth sciences. In Section Three, Attitude Scales, procedures for construction of an attitude scale and a report of the use of one with social studies students and the use of a scale by students to assess teacher performance are presented. Projections for continuing the research into the second year are given. Tables and references are included. (CM)

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RESEARCH IN READING IN THE CONTENT AREA

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FIRST YEAR REPORT

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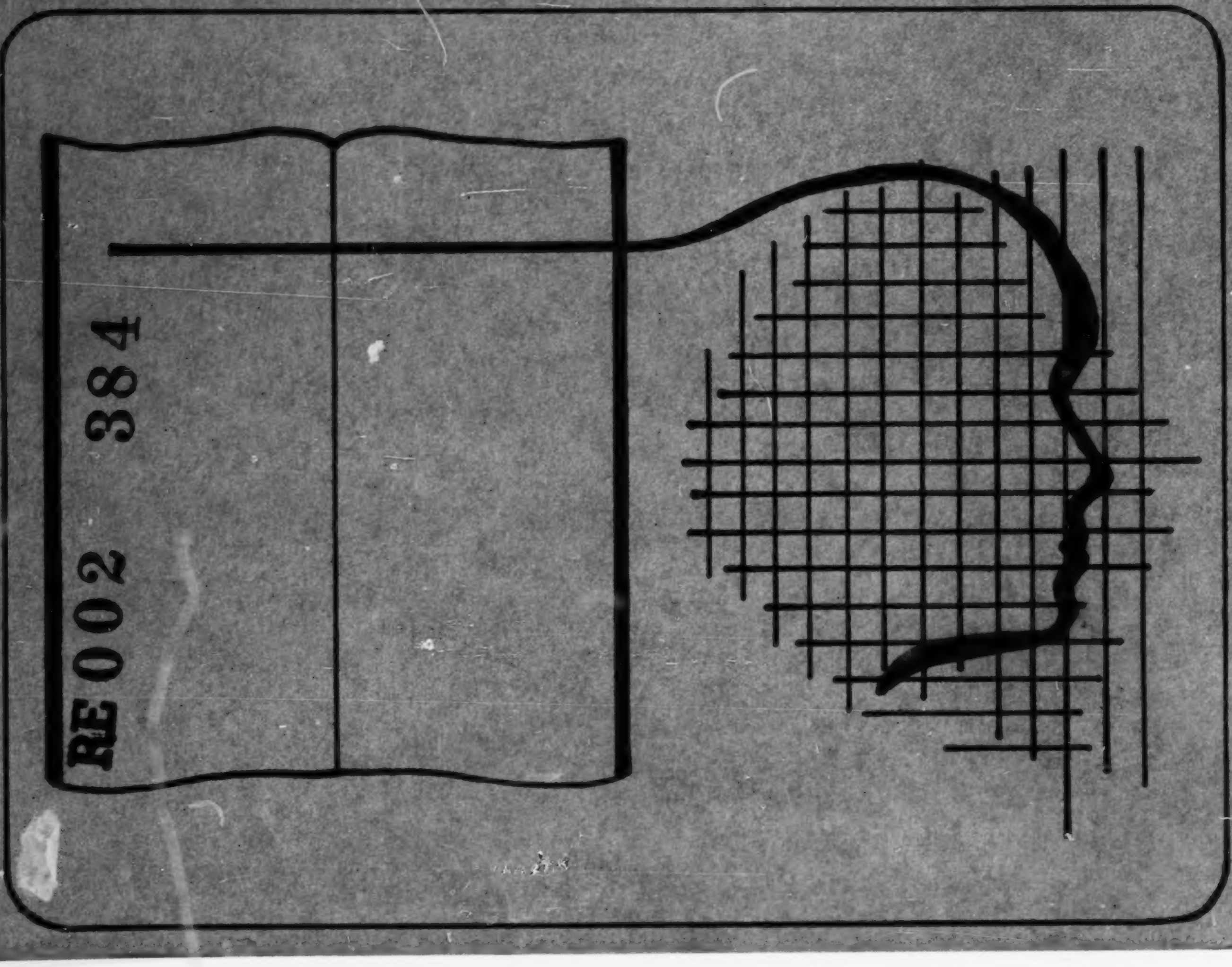
HAROLD L. HERBER
PETER L. SANDERS



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HAROLD L. HERBER

PETER L. SANDERS

Reading and Language Arts Center
Syracuse University

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We wish to acknowledge the contribution of the following publishers by their permission to publish articles and excerpts in this monograph: Cambridge Book Co., Inc. for the excerpt from *Regents Review of English;* Educational Records Bureau for the article from *"Climate For Learning: The Teacher as a Person"*.

As the title indicates, this is the first report on our research project. We anticipate publishing similar reports at the end of each of the two remaining years.

HAROLD L. HERBER, DIRECTOR
Research and Demonstration
Centers in Secondary Reading

READING INSTRUCTION IN CONTENT AREAS: AN OVERVIEW

Harold L. Herber

In his book *Toward a Theory of Instruction*, Jerome Bruner (1966) says,

> A spirit of innovation is in the land and the funds for research are becoming available. But it would be a mistake to close this volume by repeating the banal motto that more research is needed. Of course more is needed. But, more to the point, what is needed is the daring and freshness of hypotheses that do not take for granted as true what has merely become habitual [p. 171].

One of the education's tired cliches, considered true by reason of its redundancy, is: "Every teacher a teacher of reading." Content teachers are repelled by this cliche because they view reading instruction as that which occurs when remedial teachers work on letter sounds with small groups of students. They see no place for this type of instructional activity in their content areas; consequently, they reject the cliche as unrealistic and the person who utters it as unreasonable.

Through a three-year research grant from USOE, we are studying reading instruction in secondary schools. Specifically, we are looking for fresh ways in which reading instruction actually can become part of the regular curriculum in each subject area. By reading instruction, however, we are not referring to the stereotyped instructional performance suggested by most content teachers. Rather, we think of reading instruction in content areas as being a conscious effort on the part of teachers to show students how to use successfully the resource materials required in each of the subject areas.

The content teacher has two major responsibilities with respect to his curriculum: 1) He must teach *content* - a specific body of knowledge. This content includes extensive *information* which students must acquire. It also includes specific *concepts* which are formed when the information is seen in sets of relationships. 2) He must teach *process* - the procedures by which students *acquire* the information and generate the concepts. This process is essentially cognitive but with two types of application. When applied to printed media for the purpose of specifying relationships and generating concepts, it can be described as a reasoning process.

This is not to say that reading is devoid of reasoning. Rather, it is to say that cognitive processes are applied one way by a reader when he acquires information from printed media and another way when he reasons about that information so as to form concepts.

Our perspective of reading instruction in content areas can be explained most clearly by contrasting the role of the content teacher with the role of the reading teacher with respect to teaching reading. The reading teacher's curriculum is a set of skills. He analyzes students' needs with respect to that curriculum and plans a program of instruction to build on strengths and compensate for weaknesses. Any expository or narrative material can serve as a vehicle for instruction in the identified skills. The reading teacher is concerned principally with skills, not with the content of the material that he uses to teach the skills.

On the other hand, the content teacher's curriculum is a specific set of concepts within a body of knowledge. He determines students' strengths and weaknesses with respect to those concepts and makes selections from his resource materials to build on the strengths of the students' content knowledge and to compensate for their weaknesses. Thus the content teacher, contrasted with the reading teacher, is principally concerned about the information and concepts contained in the resource material he selects for use in his subject. He never selects it merely because it requires the use of certain reading skills and can serve as the vehicle for their development. Nevertheless, he can give students instruction in how to read the material he has assigned. First, he can examine each assignment in his text to determine the processes by which students gather information and develop the important concepts. He then can show students how to apply those processes he has identified. He can do this for each assignment.

Thus, whereas the reading teacher teaches reading directly, the content teacher teaches reading functionally, not for its own sake but rather as processes to aid students' acquisition of his course content.

It is from this perspective that we have engaged in the study of reading instruction in the content areas in secondary schools. Our studies have been possible through the cooperation of the senior high faculty and staff in the Jamesville-Dewitt School District, Dewitt, New York. This monograph is a report of our first year of research activity. A similar report will be issued at the end of each of the next two years.

Assumptions

Specific assumptions are embodied in this perspective of the nature and purpose of reading instruction in content areas. They are the generative source of our research studies.

1. We assume that the place for this functional teaching of reading in secondary schools is in the content classroom, with the instruction provided by classroom teachers using their curriculum materials as the vehicle for that instruction. Though remedial instruction is required for some students and must be provided by specialists in remediation, the percent of the total student population requiring remediation is relatively small.

   New instructional techniques are required for teaching reading in content areas. We assume it is not sufficient merely to apply in a more generalized fashion techniques found successful in remedial instruction. The needs, the context, the purposes are all quite different.

2. We assume that "reading" is more than a mere decoding process; that it includes not only the apprehension of symbols - whether single letters or whole words - but also the generation, synthesis, and application of ideas stimulated by those symbols.

3. We assume that printed material is only one medium through which students can gain information and develop ideas. Research into reading instruction should be as concerned with the proper reading of films and other projected media as it is with reading of print in book form.

4. We assume that the content of material determines the process by which it is read. That is to say, the ideas to be acquired dictate the manner in which the reader should respond to the material to ensure their acquisition. The teacher's task is to acquaint students not only with content of resource material but also processes by which content is acquired. When material is analyzed to determine the process indicated by the content and the students are taught that process as they read that content, there is a simultaneous teaching of reading skills and course content.

5. If there is to be a simultaneous teaching of content and process, we assume lessons must be well structured, never haphazard. In addition to the preparation and evaluation phases of lessons - which generally are known and practiced - there is the guidance segment of lessons, which is frequently the subject of exhortation but rarely of application. Guiding students in the application of process so that they understand both it and the content is the heart of the matter.

6. Students, not curricula, are the reasons for schools' existence. Therefore, when adjustments have to be made, we assume the curriculum should be adjusted to suit the needs of students rather than the reverse. When we say that content and process can be taught simultaneously

within the regular classroom and that the vehicle for this instruction is the regularly required resource material of each curriculum it is assumed that the curriculum will be adjusted to meet the needs of the students so that it can properly serve as this vehicle for students' improvement.

7. We asumme the role of the teacher must change. A teacher can shift the burden of learning to his students and help them carry it rather than holding to himself the knowledge students should obtain and dispensing it daily in piecemeal fashion. When the teacher views himself as a guide to students' learning experiences, his students are not placed in the position of trying to guess what is in his mind as he asks questions.

8. We assume that iterative research should be applied to the components of an instructional system so the system can be clearly defined before it is subjected to comparative studies with other similarly well-defined methods. Each component of the method should be subjected to many short term studies - mini-studies, if you will - each of which is conducted after the effects of the previous one have been determined and appropriate adjustments have been made for the next study. At the end of this series of iterative studies, the components are well defined and can be combined into a whole system which, ultimately, can be compared with other similarly well-defined systems.

As we progress through our studies, we know we will have to adjust these assumptions, based on hard data. Undoubtedly some will be replaced while others will be modified. Meanwhile, we have pursued specific studies generated by these assumptions.

Areas of Investigation

Using the technical vocabulary related to purpose of our research project, I have designed the "Structured Overview" in Figure 1.

A structured overview is a design created out of the basic vocabulary of a unit so as to show relationships among concepts represented by those words. This one gives some perspective to the areas of concern we are investigating. Clearly, it includes more than we can hope to accomplish in a 3-year period of time, but the balance of this monograph attests to the progress that we have made thus far.

By reference to this structured overview, we can place the areas of investigation in proper perspective according to their relative importance and the degrees of emphasis to be placed on each. The structured overview also makes clear

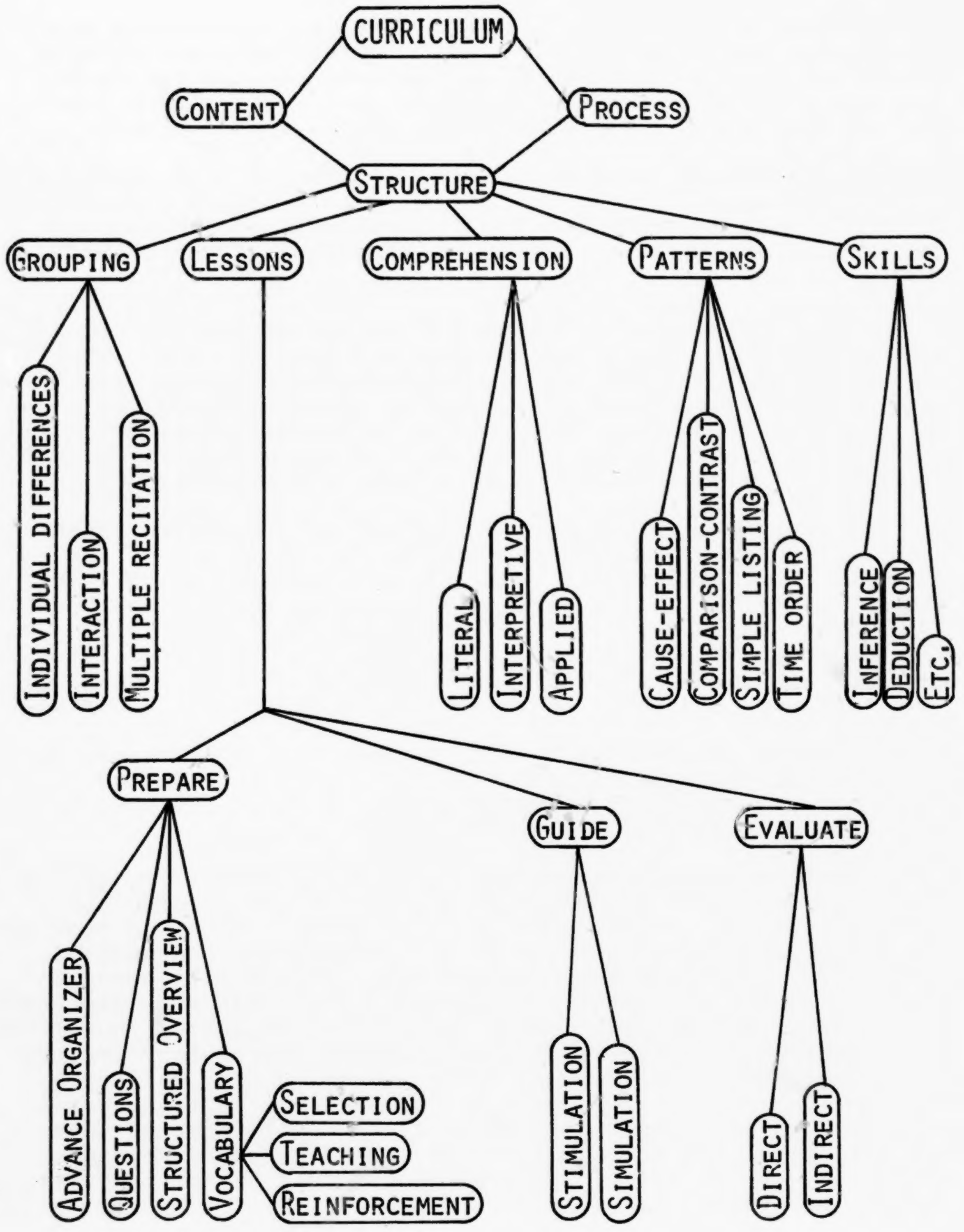
CURRICULUM
CONTENT
PROCESS
STRUCTURE
GROUPING
LESSONS
COMPREHENSION
PATTERNS
SKILLS
INDIVIDUAL DIFFERENCES
INTERACTION
MULTIPLE RECITATION
LITERAL
INTERPRETIVE
APPLIED
CAUSE-EFFECT
COMPARISON-CONTRAST
SIMPLE LISTING
TIME ORDER
INFERENCE
DEDUCTION
ETC.
PREPARE
GUIDE
EVALUATE
ADVANCE ORGANIZER
QUESTIONS
STRUCTURED OVERVIEW
VOCABULARY
SELECTION
TEACHING
REINFORCEMENT
STIMULATION
SIMULATION
DIRECT
INDIRECT

FIGURE 1

the components of a system of instruction we hypothesize as appropriate for content areas. Though components are studied separately - to the extent that it is possible for one to be isolated from the others in classroom centered research - we believe that all must be combined in actual application.

The *curriculum* is the encompassing component of our study. *Content* and *process* are the two important elements in the curriculum and our research is concerned with both. Content and process are fused in *structure*, the means of their expression and application.

Bruner (1966) lists "structure" as the second feature of a theory of instruction, saying that a theory "...must specify the ways in which a body of knowledge should be structured so that it can be most readily grasped by the learner [p. 41]." The potential that lies in structure is "...its power for *simplifying information*, for *generating new propositions*, and for *increasing the manipulability of a body of knowledge*...."

We hypothesize that the "structure" of our instructional system is composed of several elements and that each of these elements is a sub-structure with its own specific parts. The purpose of each sub-structure is the same as that of the main structure: to render a body of knowledge capable of being easily grasped by the learner. The task that we have set for ourselves is to investigate the composition of each of the sub-structures and the interrelationships that exist among all.

As shown in the structured overview, *levels of comprehension*, *organizational patterns*, *skills*, *grouping*, and *lesson structure* are the major sub-structures. Each of these is elaborated by a listing of its parts.

Levels of comprehension are literal, interpretive, applied. Four *organizational patterns* are listed: cause-effect, comparison-contrast, simple listing, time order. *Grouping* provides for individual differences, student interaction, and multiple recitation. *Lesson structure* has three components: preparation, guidance, evaluation; and each of these has sub-components. *Preparation* may take the form of an advance organizer, questions, or a structured overview; it also includes "vocabulary improvement," which requires the selection, teaching, and reinforcement of the technical language of the subject. *Guidance*, the structure within lessons, stimulates the development of ideas and stimulates the process by which the ideas are developed. *Evaluation* can be direct, through formal testing, or indirect, through the functional teaching of skills.

Out of this full set of interrelated concerns, we have selected several for careful study this year: grouping, lesson structure, vocabulary, comprehension. Because of their interrelatedness, none can be completely isolated for purposes of investigation. Indeed, because we view all of these elements as components of a unified system of instruction, we do not wish to have them be considered factors that can be treated in isolation. Nevertheless, for purposes of our iterative studies, we do try to study each component by giving it principal attention, knowing we cannot isolate it completely from the influence of the others.

Grouping

In the most frequently observed type of classroom instruction, students are rather passive observers of what is going on while the teacher directs the activity. Our hypothesis is that a teacher can change his role to become a guide to students as they learn by interacting with one another in small groups. We believe they will learn more by this interaction within the structure of the teacher's guidance than when they are passive observers to the teacher's interaction with relatively few students in a whole class discussion. We are investigating the effect that students' interaction in small groups has on their learning of both process and content. Particularly, we are investigating the various protocols possible for this type of student interaction and the possibilities for establishing task specifications so as to maximize the value of the interaction.

Lesson Structure

If improved understanding of content and facility with process is to be the objective of student interaction, such interaction must be guided by some structure which stimulates an understanding of content and simulates an application of process. Thus guided, students experience a simultaneous development of process and content with sufficient frequency that ultimately they can exercise both with independence. We are investigating the effectiveness of various types of guide material to give to students as they respond to different media and subsequently experience interaction within groups, with the focus being - again - both on the content and process. Such structures - or guides - assume the exercise of the full lesson structure; that is, an assumption that students are properly prepared for guided response to required media and that they engage in follow-up activities which reinforce, evaluate, and extend their understanding of content and application of process. The *structure within* lessons, the guides, provide what Bruner calls for when he says, "The answer is the design of exercises in conjecture, in ways of inquiry, in problem finding [p. 160]."

We are investigating the use of the Structured Overview, as illustrated in this section, as part of the preparatory phase of lessons. We hypothesize a significantly positive effect on students' learning of process and content as the result of exposure to this means of preparation for a learning task.

Vocabulary

Each discipline has its own special language which needs to be taught to the uninitiated. There is a process to be taught, as well as a content, with respect to the technical language of a subject. We are investigating problems related to the selection, teaching, and reinforcement of the technical vocabulary in several subjects. These studies are being conducted in regular classrooms by content teachers, within the confines of the regular curriculum normally taught. We hypothesize that the language of a subject can be taught in such a way that students develop an understanding of the concepts embodied in that language and also the processes by which the independent acquisition of such language is possible.

Comprehension

We hypothesize that the nature of comprehension can be stated and taught in rather simple terms. Herber has generated a theoretical construct of comprehension, expressing it in terms of levels of comprehension. The levels are the literal, interpretive, and applied, each with separate components. (The construct is explained in detail on pages 14 & 15. We have designed guide material according to this construct and are developing a test to measure students' achievement in comprehension as defined by this construct.

We believe there is an important interrelationship among Levels of Comprehension, Organizational Patterns, and Specific Skills. We hypothesize that levels of comprehension serve as the gross treatment of the reading process, and that these levels embody organizational patterns which, in turn, embody specific skills. The general practice in reading instruction is to focus first on specific skills, then to teach the organizational patterns as more global strategies. Rarely does one find this sequence extended to include instruction in levels of comprehension. Our hypothesis is that instruction should progress from levels to patterns to skills. If levels encompass patterns and patterns encompass skills, then focus on the simple concepts of three levels of comprehension allows the functional development of organizational patterns. Subsequent instruction in patterns allows functional development of skills. (The relationship among these three elements is discussed on pages 13 - 21.) We have made some attempts to test this hypothesis but have not been successful as yet. Thus far, however, we feel that it is a profitable area to pursue.

Multi-Media

We hypothesize that the techniques found appropriate for simultaneous development of process and content are as useful when applied to media other than print as they are to print itself. We are investigating the effectiveness of guide material, intra-class grouping, and preparatory activities as means to assist students in the understanding of process and content as they respond to motion pictures.

Interrelationships Among Areas

We believe that these areas of investigation have a close interrelationship. We have expressed it in the pictorial representation in Figure 2. You will note that we have identified four areas of concern: vocabulary development; levels of comprehension; levels, patterns, skills; multi-media. You will note that related to each of these areas of concern are reading and reasoning guides, these being the structures within lessons which stimulate an understanding of content and simulate an application of process. Reasoning guides are related to those areas of concern which focus on activities occuring mainly before or after the media are actually read. Reading guides focus principally on those areas of concern which occur during the act of reading the media.

You will note that the areas of concern and the two types of guides converge on "grouping" or "student interaction." Regardless of the area of concern or the type of guidance given to the students, we hypothesize that it is appropriate and profitable for students to be able to interact with one another within small groups within the regular classroom.

The outside rim of this figure shows what we project to be the byproduct of this research. We anticipate the development of lesson models and model programs; specific teaching, learning, and consultant strategies will be learned; reasoning, reading comprehension, and - perhaps - readability measures will be developed. Clearly this is 20 years' work rather than 3, but we have begun.

Findings

The articles in this monograph are position papers on and reports of findings from our "mini-studies," short term studies of an iterative nature. They cover three broad areas: levels of comprehension, lesson structure, and attitude scales. Our studies in intra-class grouping are not sufficiently definitive to be included in this publication. The reader will note, however, that intra-class grouping was used in several studies - not as the subject of analytical study but as a variable in methodology with assumed value. Our next report will include studies of the value of intra-class grouping and the means by which to maximize its effectiveness.

In Section One, Herber presents his theoretical construct of levels of comprehension. David Honeycutt discusses the development and implications of an evaluative instrument for the construct.

RESEARCH MODEL

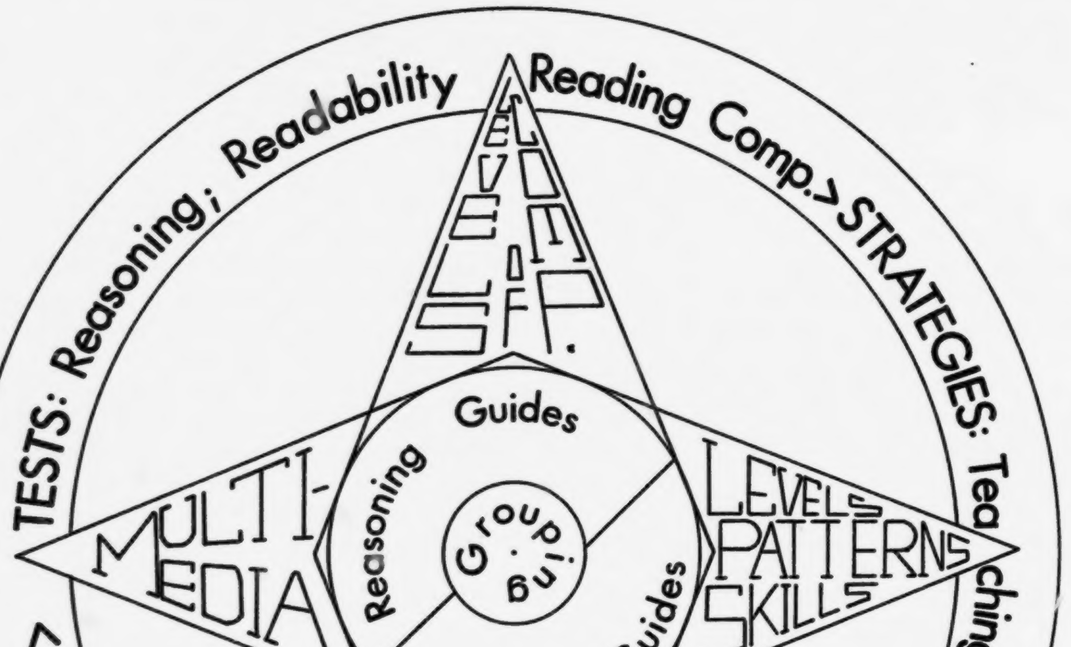
TESTS: Reasoning; Readability
Reading Comp.> STRATEGIES: Teaching; Learning; Consulting >MODELS: Lesson; Reading Program >
LEVELS
DOM of P.
MULTI-MEDIA
LEVELS
PATTERNS
SKILLS
VOCAB
DEVEL
Guides
Reasoning
Grouping
Reading
Guides

Figure 2

In Section Two, Lesson Structure, Richard Barron presents a theoretical paper on the "Structured Overview." Thomas Estes, Daniel Mills, and Richard Barron report findings from research using the structured overview, in biology and English. Richard Earle presents a paper on his research which utilized the structured overview in mathematics. Judith Thelen reports a pilot study in Earth Science, using Advance Organizers and guides for use in content classes. Estes reports the findings of his pilot study on the use of study guides and intra-class grouping in world history.

In Section Three, Attitude Scales, Estes discusses procedures for constructing an attitude scale and reports the one designed for use with social studies students. Thelen presents and discusses a scale used by students to assess teacher performance.

Projections

During the second year of our research project, four additional research interns will be added to the staff. Many of the studies conducted this first year will be replicated or repeated after modification. A second school has been added to the cooperating institutions. Our research this year was conducted principally in the Jamesville-Dewitt High School. Next year, research also will be conducted in Tully, Lafayette, and Fabius High Schools. This will provide a variation in populations so that we can investigate the efficacy of methods and materials with students from various backgrounds.

Investigations into the possibility of teaching reading in content classes cannot be based on hypotheses that meet Bruner's criteria of daring and freshness. The whole idea that such instruction can and should take place has been taken for granted as true for too long.

The problem is not in the condition of the hypotheses however, but in the actual application of the assumed truth. The solution seems to lie in modifying practices proven useful in reading classes and combining them with new techniques designed for use especially in content classes. This is the direction we have taken and we are encouraged with the results.

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STUDY SKILLS: READING TO DEVELOP, REMEMBER, AND USE IDEAS

Harold L. Herber

Study skills are work skills, skills that produce useful knowledge for a learner. Study skills generally are associated with reading skills - and this is correct. But study skills are more than "reading skills." They are *especially adapted* reading skills - skills that are adjusted to execute particular tasks. Smith (1964) supports this view when she says "...the study skills in reading may be broadly defined as those skills used when we intend to do something with content while reading it or after finishing the reading [p.32]." Used in this manner, reading skills are referred to as reading-study skills.

But study skills are not exclusively limited to reading. One obtains information in ways other than reading: listening, observing. One *reasons* about this information in order to make it useful. Though there are obvious limitations to such categorization, one might label the skills required to process information acquired through non-reading processes as "reasoning-study skills." This, obviously, is not to say that reading is void of reasoning. Rather, it is to say that information to which reasoning skills are applied can be obtained by means other than reading. If the information is to be useful, it must be processed, and reasoning skills provide the means.

Both reading-study skills and reasoning-study skills, as defined, relate to the acquisition and processing of information. One must be concerned with the study skills which produce - or reproduce - information as well. These are the output-study skills, if you will, which insure the accurate, well-organized, and well-reasoned production of information after it has been acquired and processed. Instruction which will improve students' study skills must account for both types, input and output, and the subcategories within each type. Young people who are taught how to use both types of study skills become efficient students, able to develop, remember, and use ideas. The purposes of this paper are to explore the theory on which the productive relationship between study skills and concept development is based and to suggest solutions to problems encountered when attempting to translate the theory into instructional practice.

Study Skills: Development of Ideas

Whether through reading- or reasoning-study skills, an important factor in education is the development of ideas as opposed to the mere accumulation of information. Teachers who reward the memorization and recitation of detail to the exclusion of the formation of concepts do a disservice to their students. Webster (1965) defines a concept as a "generalization drawn from particulars." Students who read for detail or who observe or listen merely for detail without generalizing concepts from that detail are dependent on highly proficient powers of recall to reproduce the detail when it is needed. They also depend on a reward system which gives priority to such recall. Bruner (1960) suggests that "...knowledge that one has acquired without sufficient structure to tie it together is knowledge that is likely to be forgotten [pp.31-32]." Concepts developed from the detail can provide the needed structure. Students who are skilled in sorting through an accumulation of detail to develop concepts are in a good position to become independent and productive learners.

The development of ideas - or concepts - closely parallels the process of comprehension. A survey of the literature on reading instruction reveals a consensus that comprehension is the end product of levels of cognition which evolve into one another, one level building on the preceding. Level One recognizes and accumulates detail. Readers identify *what is said* in the medium. Conditioned readers organize this detail in some structured form and store the resulting concepts for later recall. Unskilled readers do not apply a structure; they are memorizers, not thinkers, attempting to accumulate and store great masses of information. They are less well off than the information-retrieval systems which are basic to the ERIC/CRIER program discussed by Professor Summers, not being as efficient.

The proficient reader quickly moves to Level Two of the comprehension process. That is, he looks for meaning in the detail which he has accumulated through Level One. He generalizes relationships among various details and is able to give meaning to these relationships by interpreting their significance and their bearing on other thoughts expressed by the author. At this Second - or interpretive - Level the reader derives meaning from the detail he identified through Level One. In effect, the skilled reader turns the detail back in on itself and interprets the significance of the relationships that result.

The reader is then prepared to enter the Third Level of comprehension. Having developed intrinsic concepts by interpreting relationships among details gathered in his reading, the reader is prepared to develop extrinsic concepts. He generates an interaction between the intrinsic concepts and concepts which have been drawn from his previous experiences and observations related to the topic. The result of this interaction is the development of extrinsic concepts - new ideas which extend beyond those immediately identifiable in the reading selection. This is the Third Level of comprehension. It is meaning stimulated by the reading selection but extending out from the medium to embrace previous knowledge and experience. This level may be called the "applied," the "expressive," the "creative."

Consider the following article (Herber, 1955) and the statements which follow it. These sentences represent two responses at each of the three levels of comprehension. It is obvious that any expository and/or narrative material can be responded to at any one of the three comprehension levels.

> For years millions of hungry seagulls have flown in-land and seriously damaged Swedish crops and gardens. Experts at first tried to reduce the numbers of gulls by destroying their eggs but found that the gulls merely laid more eggs.
>
> Now, armed with saucepans and cooking stoves, the experts boil the eggs and carefully replace them in the nests. The gulls, not knowing the eggs will never hatch, sit on them hopefully until it is too late to try again.

1. Swedish farmers are trying to destroy the seagulls before the gulls destroy the crops. - OR - A good way to keep seagulls from multiplying is to make it impossible for their eggs to hatch.
2. Seagulls don't recognize hard boilded eggs even when they are sitting on them. - OR - The Swedes have found a way to control the seagull plague.
3. Man's ingenuity insures his survival. - OR - If at first you don't succeed, try, try again.

The combination of the three levels of comprehension constitutes the first phase in the effective development of study skills: production of ideas. Without competence in this phase, a student's efficiency in study is seriously limited.

Study Skills: Remembering Ideas

Once concepts have been developed they must be recalled if they are to be of use to the student. Frequently, student response to this need takes the form of rote memorization. Memorizing the product of comprehension is useful but, standing alone, memorization is an inadequate study procedure. Equally important as the recall of the product is the recall of the process of concept formation. If one has understood clearly the process employed to derive the concepts, then it is more likely that he will recall the process and its end product. Bruner (1962) suggests that

> The child who has flooded himself with disorganized information from unconnected hypotheses will become discouraged and confused sooner than the child who has shown a certain cunning in his strategy of getting information - a child who senses that the value

> of information is not simply in getting it but in being able to carry it. The persistence of the organized child stems from his knowledge of how to organize questions in cycles and how to summarize things to himself [p.86].

In situations which demand immediate recall of detail, students can depend on powers of memorization and reproduction. However, in conditions which require delayed recall of detail, only the most intellectually favored students experience a high incidence of success. Understanding the process of comprehension raises the level of success in recall of detail. Students are required to store for immediate retrieval only the major concepts because when these concepts are recalled, students can trace back through the levels of comprehension, providing extrinsic and intrinsic interpretations as well as reconstructing the detail which provided the basic stuff to form the concepts. So recall is aided by an understanding of the function of the three levels of comprehension and how ideas are developed by employing these levels. But there is another significant aid to recall: patters of organization. "The key to retrieval is organization...any organization of information that reduces the aggregate complexity of material by embedding it into a cognitive structure a person has constructed will make the material more accessible for retrieval (Bruner, 1962, p. 95)." Expository material may be written in a variety of organization patterns. Niles (1965, p.60) identifies expository patterns as enumerative order; time order; cause-effect; comparison-contrast. Niles (1965, pp.57-76) and Courtney (1965, pp. 77-96) suggest that efficient study is a matter of perceiving and subsequently producing these organization patterns as one reads and responds to what he has read. Both factors present specific instructional problems. These are treated later.

Study Skills: Using Ideas

The mark of a successful student is his ability to use the ideas he has developed and remembered. Gardner (1964) implies that our instruction is woefully inadequate if it is directed to students as though their minds "...are storehouses to be filled rather than instruments to be used [pp. 21-22]." This is to say that the reward systems in education frequently encourage rote response from a "storehouse" filled with - many times - unrelated bits of information. Objective-type tests encourage this response. Teachers pressured by extensive curriculums devote minimal time to questions which probe the mind and require reasoned, thoughtful responses. Students are rewarded for memorizing notes taken from lectures and reproducing them at examination time, with little assimilation of their significance or content. Much of our instruction forces students to turn information back in on itself - seeking significance from bits of information, developing fragments of ideas - and fails to encourage outward extension of ideas - generalizing principles from information and experience and applying those principles to new or untried situations.

The successful physics student does more than memorize formulae and the results of laboratory study of principles related to Conservation of Momentum, for example. He generalizes from his understanding of the "intra-principle" factors of force, velocity, vectors, etc., to an understanding of "extra-principle" applications, seeing - for example - the reasoning behind the use of seat belts in vehicles. The history student does more than memorize Hamilton's five plans which were to establish a sound financial base for the United States in its infancy. Rather, he generalizes out from that information and applies the concepts to economic problems experienced by emerging nations as well as to current problems in the economy of this country. The literature student preceives in Thoreau's *Walden* a commentary on affluence, mindless plunging after illusive dreams, and fading principles, rather than a set of quotations to be memorized and he judges the appropriateness of this commentary as he applies it to his own society.

In a sense, the "use of ideas," following their development and recall, is an extension of the third level of comprehension discussed earlier. It is extending ideas from the immediate internal meaning, perceiving the appropriateness of the ideas to related but different conditions, and making the application. It is, in effect, the *end* process of education - the appropriate use of ideas - with the process of development and recall of ideas being only the *means*.

> Our aim as teachers is to give our student as firm a grasp of a subject as we can, and to make him as autonomous and self-propelled a thinker as we can - one who will go along on his own after formal schooling has ended [Bruner, 1962, p. 87].

Many students fall short of this goal because they are not competent with the means for attaining it. Others make the means their end and never discover the true worth of education. In either case, students can be helped, through proper instruction, to attain a level of competence with study skills so that their purpose and value are placed in proper perspective. How teachers can help students is a crucial problem. Factors related to such instruction are the subject of the remainder of this paper.

Two specific factors relate to the teaching of reading-study skills, each of which represents a problem area in teaching. These factors are *Transformation* and *Structure*.

Transfer vs. Transformation

Smith and DeChant (1961) assume that

> No educator questions the importance of transfer of learning. If transfer were not possible, the learner would have to acquire new behavior for each new situation...Transfer may be defined as the effect of pre-

> vious learnings upon our later proficiency under different conditions or upon the ease with which we later acquire some other performance. In short, it is the application of our previous learnings to our current problems [p. 68].

Transfer does make possible a generalized use of knowledge and skills and creates greater economy in learning.

Reading-study skills are general reading skills which are marshalled to perform a specific task. One can draw the inference that the principle of transfer is at work here; at least, there is the assumption the general reading skills learned in reading classes are transferred to and applied in the study of various subjects among the grades.

But there seems to be agreement in the literature that certain reading-study skills are not transferable. This is because the skills in question are peculiar only to specific subject areas and are appropriate to no other. The logical conclusion, then, is that direct instruction in the development of these skills is required as part of the course content. This includes the initial exposure to and explanation of the skill as well as reinforcing practice. Transfer is anticipated *within subject areas*, as students progress from grade to grade, but not among subjects within grades. I am not convinced that the problem of student inefficiency in study is a matter of transfer. In the same vein, I have serious doubts that each subject area has the considerable number of skills unique to itself as has been supposed. We are now in the process of studying this factor of uniqueness. We are searching the literature to find and collate lists of skills supposedly unique to each subject area. Our preliminary findings indicate that the uniqueness lies in semantics rather than in skills; different authors use different names for the same process. My experience in directing programs for promoting proficiency of study-skills in content areas supports this observation.

One finds, then, that young people study their course content more frequently by guess than by design. The logical assumptions related to transfer are not fully supported in fact or experience. This is because the essential factor is unaccounted for: *Transformation*. Transformation is the adaptation of a skill or process to meet the demands of material peculiar to a content area. The need for this adaptation is clear when one reconsiders the point made earlier that reading-study skills required in one subject generally are appropriate to other subjects.

There are two kinds of transformation: horizontal and vertical. Horizontal transformation is turning from one subject to another and then another within the same grade, finding that a given study skill is required to perform successfully in each of the subjects but adapting the study skill to meet the peculiar demands of reading matter in each of the subjects. Though the same skill is applied in all of the subjects, some adaptation of the skill is required because of the uniqueness of the material in each area. This is precisely the key: it is not the skill that is unique; rather, the material to be studied is unique. As the student applies the skill in each of the areas, the process is very much the same. But because a different set of ideas, different set of values, a different vocabulary are fed into this process for each of the areas, the student must adapt the process to meet the peculiarities of each area.

For example, a student must be able to handle one of the organizational skills referred to previously: cause and effect relationship. One reads for cause and effect one way in science, another in math, another in social studies, and another in literature. The process is the same but idea sets are different in each. Cause and effect relationship is the pattern; but there are differences in application due to the content. Therefore, as the student moves from subject to subject he must make a conscious adjustment in the application of the skill to suit the set of ideas peculiar to each area. This is not accomplished by depending on transfer. It must be taught as transformation process. And the only place where this can be taught effectively is in each classroom, by content teachers, as students move from subject to subject.

There is another type of transformation, the vertical. As students progress through the grades, the concepts and materials which they are required to handle increase in sophistication at each grade level. As a student moves from grade to grade within a subject he must be able to adapt his skills to handle the increased sophistication of materials to which his skills are applied. Again take the cause-effect organizational pattern. Whether applied to a simple or a complex set of materials in a content area, the process or relationship set is the same. However, because the concept load is so much more sophisticated in the one, an adaptation in the skill is necessary in order to handle the material adequately.

Neither vertical nor horizontal transformation can be assumed. Students need to be shown how to adapt the skills, must learn how it feels to study successfully making necessary modifications and adaptations in skills as subjects and grade levels require. Then students will possess study skills needed to develop, remember, and use ideas. The key to this is that they must be shown how; which leads us to our second major factor: *Structure*.

Structure

Hughes (1962) says: "There is a relationship between the development of content and the nature of the control exercised by structure. When the structure permits no exploration on the part of children it serve to delimit and restrict [p. 251]." Conversely, one might say that when there is no structure, the students are abandoned to their own resourcefulness to find a way to discover the content, a feat accomplished by many, but an unnecessarily inefficient and profitless experience. How much better to expend the energy *using* skills to explore content than *discovering* the skills by which the content eventually will be explored. Therefore, whereas one should fear too much structure, one should also fear the lack of it.

When we talk about structure it is in the sense of establishing a set of experiences so that students consciously manipulate the components of a skill or a concept to the end that the total process is experienced or the total idea perceived. Again Bruner (1962) makes comment on this point: "Subject matter presented so as to emphasize its structure will perforce be of that generative kind that permits reconstruction of the details or, at very least, prepares a place into which the details, when encountered, can be put [p. 121]." As it is true of subject matter, so it is true of skills. Whether the material to be studied is simple or sophisticated, whether the student is slow or bright, a structure is needed so the student will learn how to do what we are trying to teach him. Take again, for example, the same cause and effect pattern. A structure can be developed to provide students a conscious experience with the process, at a simple level or a complex.

The structure within which the student learns to apply and transform a skill is basically the same, regardless of the content or grade level. The skill is broken down into its parts and these are provided as alternatives which students manipulate as they respond to reading matter. By manipulating these alternatives, students consciously experience the application of a specific study skill. Subsequently, the students can apply this skill to new situations within the same content area or adapt the skill to other content. In either case, the structure of lessons provides a direction for the student as he learns how to adapt a study skill to a new situation and to the demands of the new material. The goal of instruction in study skills is for students to become independent in their use of skills, able to adapt them to any kind of material at any grade level, able to adapt them to suit their personal style.

Summary

Students are successful readers when they can readily transform a repertoire of skills to meet the demands of varying content and levels of sophistication within content. Able to adapt skills to meet specific purposes, successful students also are able to develop, remember, and use ideas that they encounter by applying the skills. Students who have been able to attain this achievement level by chance are fortunate, but they have had to waste time. Students who have been guided to this level of achievement by conscientious teachers, are most fortunate. Their teachers did not assume their competence; they assured it. Efficiency is the result; possession of study skills to develop, remember, and use ideas.

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THREE LEVELS OF COMPREHENSION: TESTING

C. David Honeycutt

Implicit in a theoretical construct of three levels of comprehension as presented by Herber are implications for teaching and testing. This paper is concerned with the principles of Herber's construct as they apply to test construction.

As a starting point, a definition for "construct" is necessary: "A construct is a concept. It has the added meaning, however, of having been deliberately and consciously invented or adopted for a special scientific purpose [Kerlinger, 1964, p. 32]." In the case of three levels of comprehension, this construct came about in an effort to meet the varied reading levels of students, to simulate the comprehension process. Study guides were made for difficult or concept-loaded material; this procedure gave students the opportunity to manipulate ideas pertinent to learning objectives specified by the teacher.

In teaching and testing with Herber's construct, a crucial educational attitude is reflected. If students are taught a particular mode of behavior, then evaluation of their performance must be based upon that same mode. Dressel (1954) aptly states: "Evaluation does not differ from instruction in purposes, in methods, or in materials and can be differentiated from instruction only when the primary purpose is that of passing judgement on the achievement of a student at the close of a period of instruction [p. 24]." In short, if students have been taught with study guides based upon three levels of comprehension, tests can be based upon the same principles used to construct guides at these levels.

Construction of Study Guides

An initial step in the construction of study guides has been in one of two directions: 1) determining the pattern of organization that seems predominant in a text selection, or 2) determining the important concepts that the student must learn. These directions may seem divergent, but a direct relationship exists between concepts and patterns of organization. According to Klausmier, Harris, David, Schwenn & Prayer, (1968) concepts are used by individuals

> (a) to reduce environmental complexity as instances are categorized and as concepts themselves are related to superordinate categories, (b) to identify objects, events, and states when encountered for the first time, (c) to reduce the necessity for relearning how to classify instances and label them, (d) to

> direct instrumental activities, and (e) to order and relate classes, not only instances, of objects, events, and states [p. 4].

The point is this: the relationship existing between concepts and patterns of organization lies in the manner by which individuals categorize, subordinate, superordinate, classify, identify, or relate information. Common patterns of organization such as comparison/contrast, cause/effect, and main idea/supporting detail act as the means by which individuals arrange information or concepts. Writers make use of organizational patterns - comparing, contrasting, showing cause and effect - in order to convey concepts to the reader. These concepts or products will reflect the patterns or processes.

This notion of relationships as a basis for thinking finds support in McCullough (1968), who indicates that thought patterns reflect relationships such as whole-part, cause and effect, sequence, comparison and contrast, and subordination and co-ordination. Barrett (cited by Clymer, 1968) demonstrates the use of organizational patterns to make inferences, various types of which - supporting detail, main idea, sequences, comparison, and cause and effect - are included under the category of "Influential Comprehension." These experts lend support to the generalization that patterns of organization serve as a basis for the structure of cognitive processes and that indicants of these processes can be reflected in study guides or tests.

The following is an example of the type of study guide described. Notice the organizational pattern and the basic structure of the statements at each level of comprehension.

> Lamarck's theory of evolution, although at one time pretty generally discredited, has now been revived by a number of prominent biologists. According to Lamarck, changes in an animal occur through use and disuse. Organs which are specially exercised become specially developed. The need for this special exercise arises from the conditions in which the animal lives; thus a changing environment, by making different demands on an animal, changes the animal. The giraffe, for instance, has developed its long neck in periods of relative scarcity by endeavoring to browse on higher and higher branches of trees. On the other hand, organs that are never exercised tend to disappear altogether. The eyes of animals that have taken to living in the dark grow smaller and smaller, generation after generation until the late decendants are born eyeless.
>
> The great assumption made by this theory is that the effects of personal, individual effort are transmitted to the offspring of that individual.

This is doctrine that is very much in dispute among modern biologists.

Level 1 - Literal

Directions: Select the statements which clearly state or represent what the author actually states.

_____ Changes in animals are due to use and disuse of special organs.

_____ A changing environment makes different demands on an animal.

_____ The giraffe's long neck is given as an example of special development.

_____ Organs that are never used tend to disappear.

_____ An assumption in dispute is that the effects of personal or special effort are transmitted to the offspring.

Level 2 - Interpretive

Directions: Select the statement which best represents what the author means. Be prepared to identify information within the passage to support your choice.

_____ A cause/effect relationship is suggested by Lamarch's theory.

_____ Animal specialties result from a changing environment and consequential adaptation to that environment.

_____ Change is an inevitable result of specialization.

Level 3 - Application

Directions: Check the statements that best reflect the appropriate use of the ideas presented in this passage. Be prepared to identify the ideas you have drawn on to justify your selection.

_____ In the country of the blind, the one-eyed man is king.

_____ Quantity and quality of food has produced better physical specimens over the past 50 years.

_____ Wheaties builds champions.

_____ One good change deserves another.

_____ As a result of an affluent society, we are gradually getting hoardes of fat Americans.

_____ A stone dropped into water affects more than the impact zone.

Observe that the pattern of organization is built upon a cause/effect relationship, and that the statements at all levels reflect that pattern.

It is not difficult to justify items for inclusion at Levels 1 and 2, since these levels are intrinsic to the material. Examples of literal statements do not depart appreciably from the statements found in the passage; they are selected to bring to the foreground those cause/effect ideas expressed by the author.

At Level 2, in order to provide the student with a "mind set" to look for relationships among details, a statement about the organizational pattern is made. The statements that follow are redundant in order to demonstrate the possibility of cause/effect inferences.

Operationally, Level 3 calls for association of the details and relationships in the passage with an individual's idiosyncratic domain of knowledge. Proverbs or thematic observations about life have been focused upon at times help students apply their literal and interpretive understandings. The use of proverbs can be justified because of the compact meanings and their universality within our society. By including universal themes, proverbs, pithy sayings, or common observations about behavior, the probability is heightened that all students can relate to ideas extrinsic to the material. These statements, too, reflect the cause/effect pattern of the sample passage.

Test Construction

Standard procedures for making tests can be found in Furst (1958) or in Gronlund (1965). The main concern here is that the principles used to make statements for a guide can also be used to structure test items.

These steps can be followed in constructing items to assess levels of comprehension:

1. Select short passages which reflect rather clearly a

writer's pattern of organization.

2. At Level 1, select the ideas expressed as most important.

3. At Level 2, make an inferential statement about the ideas of the paragraph. The statement will both summarize the content and reflect the organizational pattern of the passage.

4. At Level 3, select a universal theme, a famous saying, or a proverb which reflects the organizational pattern of the passage.

The following example demonstrates this procedure. Notice that the correct responses clearly mirror the comparison/contrast pattern of organization.

> We all know people who would welcome a new American car to their stables, but one cannot expect to find a sports-car man among them. He cannot be enticed into such a circus float without feeling soiled. He resents the wanton use of chromium as much as he shudders at the tail fins, the grotesquely convoluted bumpers, and other "dishonest" lines. He blanches at the enormous bustle that adds weight and useless space, drags on ramps and curbstones, and complicates the process of parking even in the car's own garage. The attitude of the owner of a Detroit product is reflected in the efforts of manufacturers to "take the drive out of driving." The sports-car addict regards this stand as outrageous. His interest in a car, he is forever telling himself and other captive listeners, lies in the fun of driving, is in "sensing its alertness on the road," and in "pampering it as a thoroughbred."

1. Select the item which *best* represents an idea stated in the passage.

   1) A sports-car man senses the importance of chromium.
   2) A sports-car man likes the convoluted bumpers of his sports machine.
   3) A sports-car man thinks that driving is outrageous.
   4) A sports-car man does not care for "dishonest" lines.

2. Select an item which *best* represents an idea not directly stated in the passage.

   1) For the sports-car addict one must "take the drive out of driving."

2) The sports-car addict and the owner of the Detroit product represent polar viewpoints.
3) Driving, to the sports-car addict, means racing tailfins.
4) The sports-car addict thinks circus floats should be pampered.

3. Select a statement which *best applies* to the ideas of the passage.

   1) It takes two to make a quarrel.
   2) The meek shall inherit the earth.
   3) A thing of beauty is a joy forever.
   4) One man's meat is another man's poison.

Summary

It has been shown that principles for structuring test items can be based upon those principles involved in making study guides. The theoretical construct of three levels of comprehension has served as the framework whereby varying degrees of understanding can be assessed.

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THE USE OF VOCABULARY AS AN ADVANCE ORGANIZER

Richard F. Barron

The major assumption underlying this paper involves a belief that the vocabulary of content subjects can be introduced in such a way that the words assume the form of "advance organizers" and provide the students with cues to the "structure" of subjects.

It is my intent to develop a rationale for the provision of a "structured overview" of content, utilizing vocabulary. Furthermore, I shall attempt to demonstrate how this procedure might be incorporated with a methodology for teaching vocabulary in content subjects (Vine, Early, Herber, Sheldon, 1967).

Advance Organizers

Ausubel (1960) hypothesized that the "learning and retention of unfamiliar, but meaningful verbal material could be facilitated by the advance introduction of relevant subsuming concepts [p. 271]." He equated experimental and control groups of 40 undergraduates on the basis of sex, field of specialization, and ability to learn unfamiliar scientific material. The learning task consisted of a 2500-word passage concerned with the metallurgical properties of steel. The experimental subjects on two separate occasions (48 hours and immediately before the learning task) were presented with a 500-word introductory passage "containing substantive background material of a conceptual nature presented at a much higher level of generality, abstraction and inclusiveness than the steel material itself [p. 172]." Control subjects were presented with a "traditional type of historical introduction of identical length [p. 172]." Following a multiple choice test administered three days later, the comparison of the experimental and control groups" mean test scores "unequivocably" supported Ausubel's hypothesis.

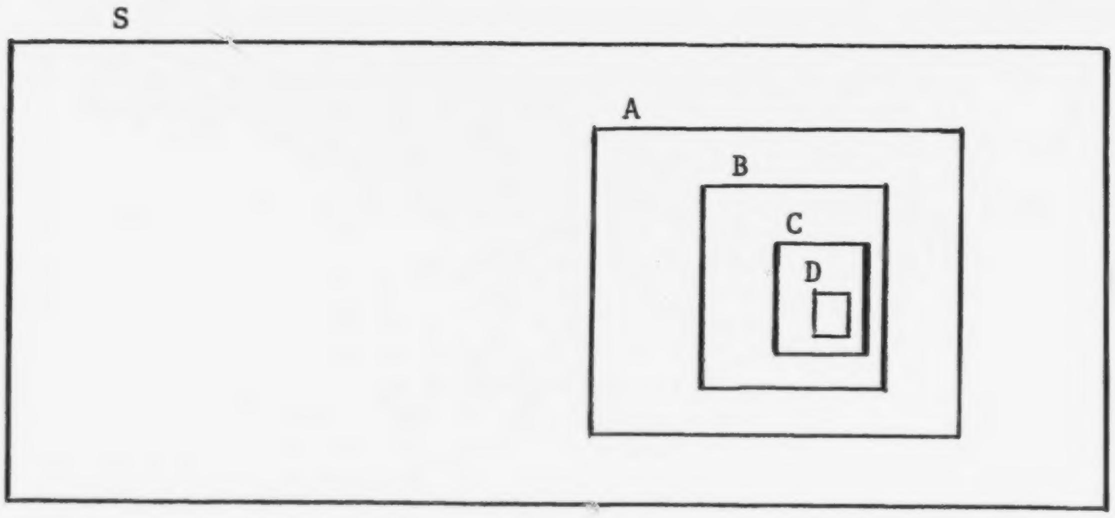
Ausubel termed the "relevant subsuming concepts" introduced prior to the learning task "advance organizers." He felt that their aid to learning and retention was due to two factors. First, they facilitated "the selective mobilization of the most relevant existing concepts in the learner's cognitive structure as part of the subsuming focus for the new learning task, thereby increasing the task's familiarity and meaningfulness[p. 271]." Second, the advance organizers provided "optimal anchorage for the learning material...[p. 271]."

Ausubel concluded that the provision of advance organizers in the teaching of meaningful verbal materials could lead to more effective retention. He suggested that such a procedure "would also render unnecessary much of the rote memorization to which students resort because they are required to learn the details of a discipline before having a sufficient number of key subsuming concepts [p. 272]."

Structure

Ford and Pugano (1964) claim that "structure" is not a difficult concept to understand. They state that structure "refers simply to the parts of an object and the ways in which they are interrelated [p. 2]." Thus, we might concern ourselves with the structure to be found within all human knowledge, within a particular discipline, within an area of study contained within a discipline, or even within specific units or lessons related to an area of study.

The preceding might be clarified through the use of a simplified Venn Diagram as in Figure 1.



[S] = all knowledge

[A] = "mathematics"

[B] = "inferential statistics"

[C] = "the normal distribution"

[D] = "the normal approximation to the binomial"

Figure 1

For the purposes of this paper, I shall utilize the word "structure" to refer to the content of any particular course of study contained within a discipline. In this sense, "structure" may be defined as the hierarchical ordering of "principles," concepts," and "details."

"Details" are defined as relatively unordered experiences and bits of information. When a number of details are ordered in such a way that they may be responded to as an abstract class, a "concept" is formed. A "principle" is defined as "a chain of two or more concepts [Gagen, 1965, p. 52]."

How is the structure of a content subject determined? Although some aid may be derived from the various curriculum study and revision committees that have been formed to consider this matter (eg. "Physical Sciences Study Committee," "Biological Sciences Curriculum Study"), I believe that the major part of the burden must rest with the classroom teacher. Based upon his knowledge of his specialty, the teacher must first determine the major understandings or content principles he wishes his students to understand. Second, he must determine which concepts must be "chained" to secure an understanding of the principles. Finally, he needs to delineate the pertinent details which, when classed together, form major concepts. Needless to say, this is an exceedingly difficult task and requires a fine analysis of content.

The end result of the teacher's analysis might be a list or outline something like Figure 2.

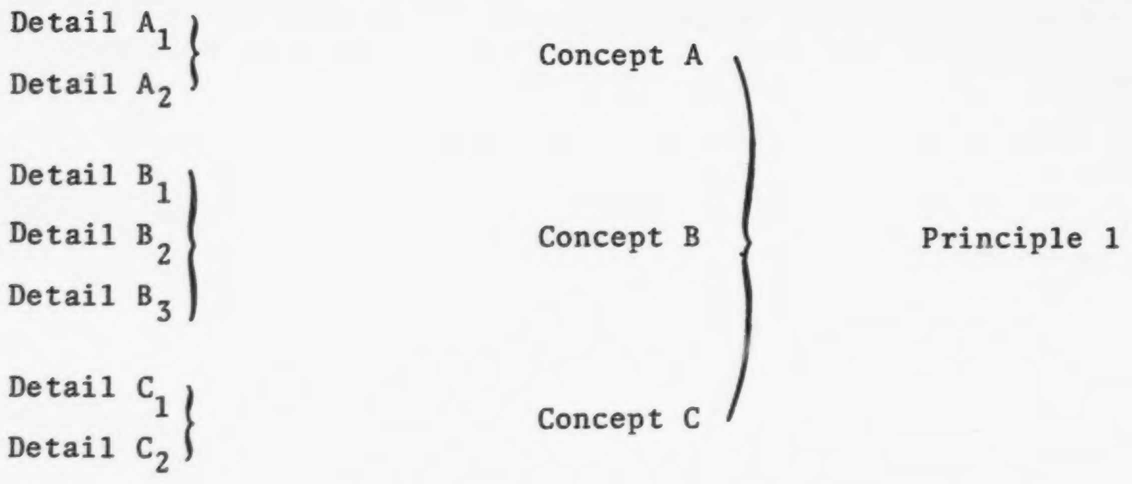


Figure 2

Structured Overview

We now come to the question of communicating content structure to students as a form of "advance organizer."

Bruner (1967) believes that a domain of knowledge may be represented in three ways: "through a set of actions appropriate for achieving a certain result (enactive representation); by a set of summary images or graphics...(iconic representation); and by a set of symbolic or logical propositions drawn from a symbolic system that is governed by rules or laws for forming and transforming propositions (symbolic representation) [pp. 44-45]."

After the teacher has identified and stated the content principles, concepts, and details that he wishes communicated to the students, he will find that certain words are unique to each. This vocabulary may be depicted through a diagram or outline (iconic representation) so that the relationships between words and the relative importance of each word are highlighted. A verbal discussion (symbolic representation) of the diagram should take place in conjunction with its presentation. This visual and verbal presentation is termed a "structured overview."

In actual practice, the structured overview might best take place prior to the introduction of each new unit of work. The overview would serve as a taxonomy of content to be taught in a given length of time. The teacher in effect would state: "This is what we are going to cover in the next x weeks. The main topic is __I__ . Who recalls what we previously discovered about I? The main divisions of I are __A__, __B__, and __C__. What do you remember about A, B, and C? We will focus on __C__. We'll find that C is broken down into five main functions: __1__, __2__, __3__, __4__, and __5__.

The diagram or outline of the major vocabulary would then take this form:

I. ____________

    A. ______

    B. ______

    C. ______

        1. ______
        2. ______
        3. ______
        4. ______
        5. ______

As described, I believe that the overview assumes the properties of Ausubel's advance organizers. It attempts to relate new content information to relevant subsuming concepts that have previously been learned. At the same time, pupils are given cues as to how the structure of the new unit relates to the structure of the course as a whole.

Synthesis and Application

Although the provision of cues to structure might contribute greatly to the learning and retention of content material, utilizing vocabulary in the form of an overview can by no means be considered a complete program for vocabulary development. At this point. I should like to attempt a synthesis with the methodology for vocabulary instruction in content subjects as advocated by Vine, et al. (1967).

In brief, the methodology referred to attempts to integrate the development of skills necessary for the reading of content material with the refinement and extension of content concepts. It consists of two broad aspects: pre-teaching and reinforcement.

To select vocabulary for pre-teaching, the teacher must analyze the text carefully. Words are selected on the basis of their relationship to major concepts, their relevance to the course, and student competency. Since content teachers would not have time to teach all of the words selected in this manner, only two or three are "carefully pre-taught" prior to reading. These words are presented in terms of the skill to which they lend themselves (ie. context, structure, dictionary). The rest of the words are pronounced by teacher and students as a means of facilitating their subsequent recognition during reading.

Reinforcement exercises are provided at another time to allow the students further opportunities to utilize skills introduced during pre-teaching. These exercises also serve to extend and refine concepts. The students perform the exercises on their own and then come together in small groups to resolve differences and to "speak the language of the subject."

An imaginative teacher can create numerous kinds of reinforcement activities, depending upon his purposes. That is, the exercises may range from those involving the mere recognition of words, to exercises that require the students to manipulate vocabulary in such a manner that new and unusual relationships are discovered within and beyond the course content.

Without the provision of a "structured overview," I believe that the methodology described might be diagramatically represented as in Figure 3.

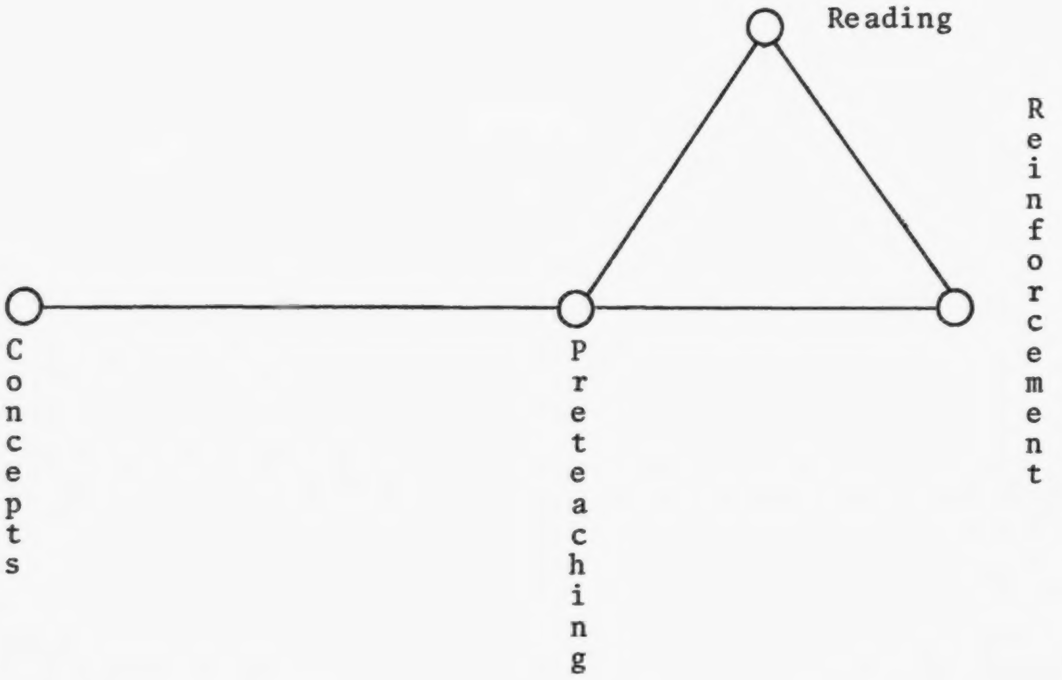


Figure 3

Major concepts yield words for pre-teaching, which may be followed by reading and/or reinforcement.

By contrast, integration of a structured overview with the above methodology for teaching vocabulary yields the paradigm seen in Figure 4.

The content's structure determines the form of a structured overview. The overview is designed to provide cues to the structure, and to provide relevant subsuming concepts for all content experiences that are to follow.

The vocabulary selected for pre-teaching generally will not be the same as that presented in the overview since the overview will be at a much higher level of generality and abstraction than any particular reading selection.

Reinforcement exercises reflect vocabulary derived from many sources of content information, rather than just pre-teaching and reading.

Example of Application

The following is an example of how a structured overview of content and the methodology for vocabulary instruction described might be combined in actual practice. It is based upon

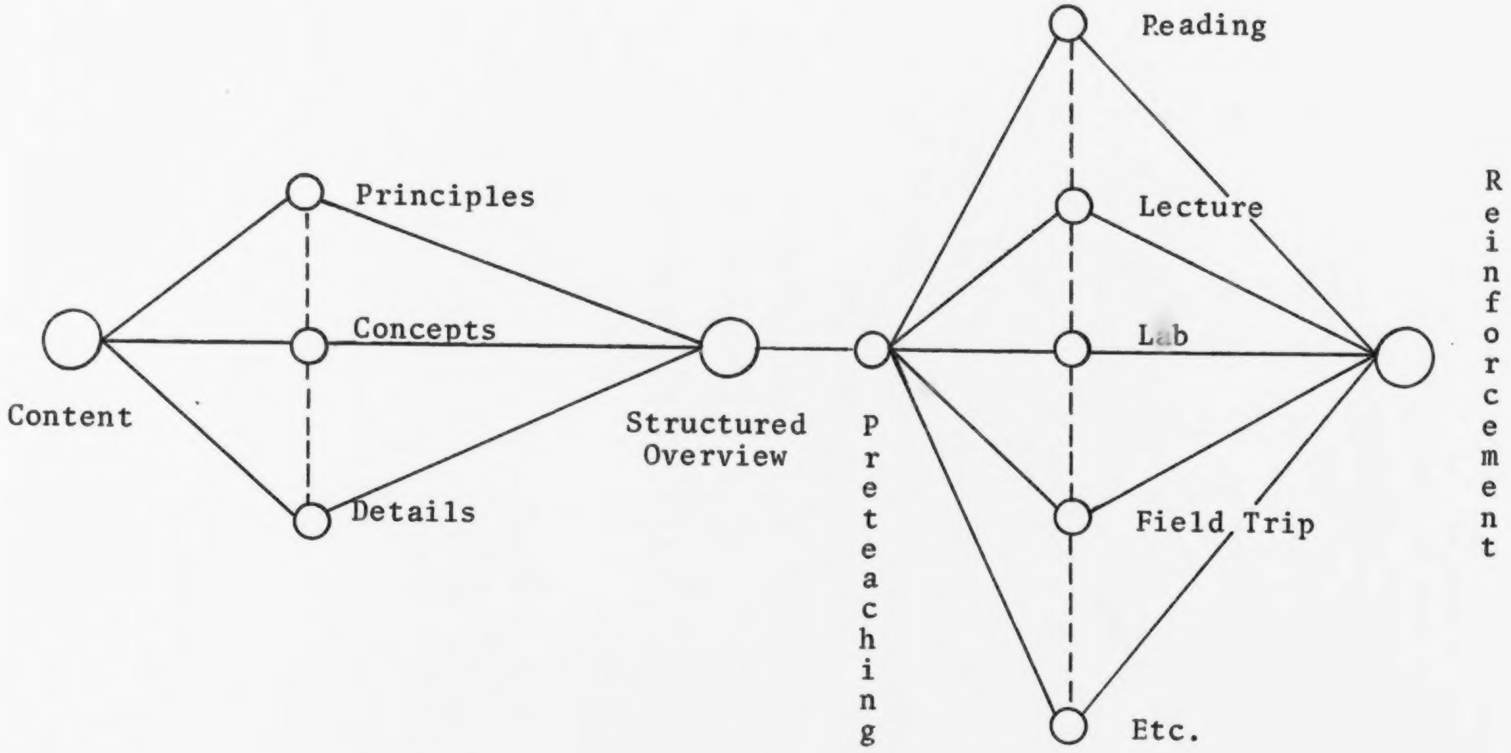

Content
Principles
Concepts
Details
Structured Overview
Preteaching
Reading
Lecture
Lab
Field Trip
Etc.
Reinforcement

Figure 4

a three-week unit on biochemistry in a tenth grade biology class.

Prior to the introduction of the unit, the teacher analyzed the content in terms of its relationship to previously introduced material and its applicability to future understandings. It was decided that the major understanding to be gained by the student was: "Cell chemistry determines the morphology and pyhsiology of the cell."

The overview of the content took the form that is shown in Figure 5.

Biochemistry--Cell Chemistry
- Mixtures
- Elements
- Compounds
    - Water
    - Proteins
    - Carbohydrates
    - Fats and Oils
    - Nucleic Acids

Figure 5

In the ensuing class discussion, the term "biochemistry" was defined and its relationship to cell chemistry was delineated. The students discussed previous contact with the mixtures, elements, and compounds that make up the chemistry of the cell. They were then informed that in this unit they would be concentrating upon compounds —specifically, carbohydrates, fats and oils, and nucleic acids.

While the unit was in progress, readings from the text (Moore, J.A., et al. *Biological Science: An Inquiry into Life*. New York: Harcourt, Brace, and World, 1963.) were required almost daily. Pre-teaching, as previously described, was utilized for these assignments. Thus, for one selection of three pages, the words taught in terms of structure were "carbohydrate" and "hydrolysis." "Glucose," "fructose," "galactose," "maltose," "sucrose," "cellulose," and "glycogin" were pronounced.

The students were reminded where the term "carbohydrate" fit in the overview and an attempt was made to point out that hydrolysis, as well as the prounced words, was subsumed by the concept "carbohydrate."

The reinforcement exercise provided by the teacher for this particular section of the content took the form of a completion exercise. The exercise, as shown in Figure 6, called for the students to recognize the literal definitions of the vocabulary.

Directions: To solve the following puzzle look at the definitions below, think of a word which fits a definition and has the same number of letters as the number of spaces provided in the corresponding line. Write the word on the line, do this for each definition.

1. _ _ C _ _ _ _

A

2. _ _ _ R _ _ _

B

3. _ _ _ _ O _ _ _

H

4. _ _ _ _ _ _ Y _ _ _

D

5. _ R _ _ _ _ _

A

T

6. _ _ _ _ _ _ E

Definitions:

1. Substance commonly known as table sugar.
2. Component of all organic compounds.
3. Another name for "animal starch."
4. Term meaning "to break with water."
5. Compound containing carbon.
6. Within the body, this is a key compound in many vital activities.

Figure 6

Toward the completion of the unit the reinforcement exercises tended to become more complex. The students were required to manipulate vocabulary so that relationships between concepts became evident. The categorization exercise, as shown in Figure 7, is one example of how vocabulary manipulation was accomplished.

Directions: Following the list of words below there are three categories. Place each word under the category to which it belongs. If you believe a word properly belongs under more than one category you may list it more than once.

amino acid
Cell Chemistry
Biochemistry
cellulose
hydrolosis
glycerol
ribonucleic acid
ionic compound
dehydration synthesis
molecular compound
organic compound
glucose
DNA
Sucrose
starch
carbon
urea
ATP

Carbohydrate	*Fat or Oil*	*Nucleic Acid*

Figure 7

Summary

Prior to the introduction of a unit in any content area, new vocabulary might be structured in terms of its relationships to the details, concepts, and principles of that unit. Presented in the form of a "structured overview," these words might approximate "advance organizers," as defined by Ausubel. Such a procedure could be integrated with the methodology for vocabulary instruction in content areas advocated by Vine, et al.

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THREE METHODS OF INTRODUCING STUDENTS TO A READING-LEARNING TASK IN TWO CONTENT SUBJECTS

Thomas H. Estes
Daniel C. Mills
Richard F. Barron

The purpose of this study was to ascertain whether differential effects exist between three methods of introduction to a reading selection, as evidenced by students' subsequent learning and retention of the information contained in the selection. The three methods under consideration were: 1) the use of advance organizers, 2) the use of the structured overview, and 3) the use of purpose questions.

Numerous authorities in the field of reading stress the importance of "readiness" for learning at all school levels (Fay, 1956; Betts, 1957; Karlin, 1964; Marksheffel, 1966; Strang, McCullough & Traxler, 1967). However, the few studies that have attempted to investigate the form that preparatory activities for reading might best take have yielded little information. For example, Frederick (1968) found that the presentation and discussion of vocabulary terms and questions prior to reading did not result in better learning and retention on the part of students.

Ausubel (1960, 1963, 1965) has advocated a theory of cognitive organization that presupposes a hierarchically organized structure consisting of highly generalized concepts, less inclusive concepts, and specific facts. He believes that cognitive structure is a major factor in learning and retention. To the extent that cognitive structure is clear, stable, and organized, learning will be facilitated. If cognitive structure is unclear and disorganized, learning will be impeded.

Ausubel developed a technique termed the *advance organizer* that is designed to clarify and organize an individual's cognitive structure prior to a learning task. In brief, an advance organizer is an introductory paragraph consisting of relevant subsuming concepts of a highly generalized nature that are already within the learner's cognitive structure and proximate to the learning task. Advance organizers are similar in construction to a chapter summary or overview, with the exception that they are more inclusive than the usual overview or summary. Also, an advance organizer is always written at a higher level of generality and abstraction than the learning material itself. Ausubel (1960) has demonstrated that provision of an advance organizer prior to the undertaking of an unfamiliar but potentially meaningful learning task facilitates learning and retention.

A *structured overview* may be described as a visual and verbal representation of the key vocabulary of a learning task in relation to more inclusive or subsuming vocabulary concepts that have previously been learned by the student. It is intended to serve two purposes. First, the overview provides a structure for vocabulary instruction in content subjects so that it does not appear to students that they are being taught a series of unrelated or equally important words. Second, the structured overview attempts to match the effect of an advance organizer by helping the learner to relate unfamiliar material to concepts that have been previously learned.

Earle (1969) found teachers readily able to devise a structured overview when they were presented with the following set of directions:

1. Select every word that you intend to use in the learning task that you feel is necessary to the students' understanding.

2. Take the list of words and arrange, rearrange, and add to them until you have a diagram which shows the relationships that exist among the ideas particular to the learning task, as well as to the discipline itself.

3. Display the diagram and explain to the students why you arranged the words as you did. Encourage them to contribute as much information as they can.

The use of *purpose questions* seems to be a traditional method of preparing students for reading in many content subjects. The teacher frames these questions specifically in terms of the learning task. The presumed effect is to guide students' reading by creating in them a "set" to respond in a particular manner.

Specifically, this study was directed toward two questions. First, does the structured overview function in a manner similar to an advance organizer? Second, does the structured overview aid learning and retention to a greater extent than purpose questions and/or no introduction to the reading-learning task?

Stated in null form, the hypotheses tested in this study were:

1. On a delayed test of learning and retention, the mean score of the group receiving the advance organizer prior to the learning task will be greater than or equal to

the mean of the group receiving the structured overview.

2. On a delayed test of learning and retention, the mean of the group receiving purpose questions prior to the learning task will be greater than or equal to the mean of the group receiving the structured overview.

3. On a delayed test of learning and retention, the mean of the group receiving no introduction to the learning task will be greater than or equal to the mean of the group receiving the structured overview.

The hypotheses were tested in two content area subjects, English and biology, using an interative approach as suggested by Levin (1965) and Krathwohl (1968). Preliminary studies were carried out in both subject areas to allow opportunities to modify the experimental treatments and to test the experimental design.

The alpha level for rejection of the null hypotheses was set at the .10 level, since a primary concern of the investigators was to determine if the structured overview showed promise as a construct for longer-range investigations.

Experiment I: English Classes

Subjects

The Ss were 55 ninth grade students enrolled in three English classes taught by the same instructor at Jamesville-Dewitt High School. The school is located in a high socioeconomic suburban area of Syracuse, New York.

Experimental Procedures

A modification of the Posttest-Only Control Group Design (Campbell and Stanley, 1963) was used. Each of the three English classes was randomly divided into four groups. During a regularly scheduled English period, the groups from each class were assigned to separate rooms, where they received one of the experimental treatments and performed the reading assignment, On the following day, Ss reported to their regular classroom, where a 17-item multiple choice test was administered to the entire class. Results of the test were pooled for each of the treatments, across classes. The hypotheses were tested by orthogonal t tests.

Learning Passage

The students read "The Black Cat" a short story by Edgar Allen Poe. This story was selected by the classroom teacher as a regular part of the content of his course.

Treatments

The Ss in each of the groups were informed that they were taking part in a study. They were told that the story to be read would also initiate a unit of study on short stories. The groups receiving introductory treatments prior to the reading were told that these were designed to aid learning and remembering. The Ss were also informed that they could expect a test on the following day. To maximize treatment effects, the Ss were discouraged from taking notes and all learning materials were collected at the end of the 35 minutes allowed to perform the reading.

The advance organizer consisted of definitions and a discussion of a number of aspects of literary style related to short stories. These included unity of impression, plot, character, setting, and mood. The advance organizer was approximately 650 words in length.

The structured overview consisted of a diagram designed to depict the idea that plot, character, setting, and mood contribute to unity of impression. Under each of these terms, the teacher listed related vocabulary from "The Black Cat." In the ensuing discussion, the teacher attempted to aid the Ss in discerning interrelationships among the aspects of style and the vocabulary terms related to each.

The purpose questions directed the students to look for relationships among Poe's use of plot, character, and setting and his development of unity of impression.

Results

Table 1 shows the results of *t* tests comparing the structured overview with the other experimental treatments. None of the results are significant at the .10 level. Thus the investigators suspended judgment on the three null hypotheses.

Experiment II: Biology Classes

Subjects

The Ss were 64 tenth grade students at Jamesville-Dewitt High School.

Experimental procedures

As in Experiment I, a modification of the Posttest-Only Control Group Design (Campbell and Stanley, 1963) was used. The students in each of three biology classes taught by the same teacher were randomly assigned to one of the four experimental groups. The experiment was conducted during each of the classes' regularly scheduled biology period. The

Table 1

Comparison of the Structured Overview with Other Experimental Treatments in English Classes

Group	X	df	t
Structured Overview	7.57	13	
Advance Organizer	7.57	13	0.00
Structured Overview	7.57	13	
Purpose Questions	7.15	12	0.39
Structured Overview	7.57	13	
No Introduction	7.14	13	0.44

four groups from each class were assigned to separate rooms, where they received one of the experimental treatments and carried out the reading assignment. On the following day, the students reported to their regular classroom, where the teacher administered a 34-item multiple choice test. Results of the test were pooled for each of the four groups, across classes; and the hypotheses were tested by orthogonal t tests.

Learning Passage

The reading selection consisted of an adaptation from a textbook that was not in general use at the school (Moon, T.J., Otto, J.H., and Towle, Albert. *Modern Man.* New York: Holt, Rinehart, and Winston, Inc., 1960, 114-119.). The passage was concerned with the form and structure of fungi. It was approximately 2600 words in length.

Treatments

The Ss in each of the groups were informed that they were taking part in a study. They were told that the selection to be read would also serve to initiate a unit of study on fungi. The groups receiving the structured overview, the advance organizer and the purpose questions were told that these introductions were designed to help them learn and remember what they read. The Ss were also informed that they would be tested on the following day. Ss were discouraged from taking notes and all learning materials were collected after 42 minutes in order to maximize treatment effects.

The advance organizer consisted of a 500-word introductory passage that discussed the material in the learning passage at an inclusive yet high level of generality and abstraction. Comparisons were drawn between algae and fungi. (A unit had recently been completed on the former topic.)

The structured overview consisted of a series of vocabulary terms organized to depict fungi within a broad taxonomical perspective. In the ensuing discussion, comparisons between algae and fungi were delineated.

The purpose questions directed Ss to consider specific concepts and facts included in the selection, as well as to look for relationships between algae and fungi.

Results

Table 2 shows the results of *t* tests comparing the structured overview with the other experimental treatments.

The comparison between the structured overview and the advance organizer yielded a *t* score that was not significant at the alpha level established prior to the experiment. Thus judgment was suspended on the first null hypothesis.

The comparison between the groups that received the structured overview and the groups that received the purpose questions revealed a difference in means that was significant at the .06 level. The second null hypothesis was rejected.

The comparison between the groups that received no preparation for the learning passage and the groups presented with the structured overview, revealed a difference between means, in favor of the latter that was significant at the .025 level. Thus, the third null hypothesis was also rejected.

Discussion

There are two primary conclusions that can be drawn from this study. First, under certain circumstances the

Table 2

Comparison of the Structured Overview with Other
Experimental Treatments in Biology Classes

Group	X	df	t
Structured Overview	23.25	15	
Advance Organizer	21.88	15	1.03
Structured Overview	23.25	15	
Purpose Questions	21.00	15	1.62*
Structured Overview	23.25	15	
No Introduction	20.56	15	2.09**

*$p < .06$ (one-tailed)
**$p < .025$ (one-tailed)

structured overview seems to aid learning and retention to a greater extent than do purpose questions and/or no preparation for the learning task. Second, under certain conditions the structured overview appears to facilitate learning and retention in a manner similar to that produced by an advance organizer. This effect would appear to be a function of the learning material and/or the existing cognitive structure of the learner.

There may be many explanations for the lack of differences in treatment effects in Experiment 1. However, observation and retrospective questioning of the subjects leads the experimenters to believe that the concepts included in the structured overview and in the advance organizer were not a part of the learners' respective cognitive structures prior to the experimentation. (This, as stated earlier, is a theoretically necessary condition for an effective advance organizer.) If this was the case, then the advance organizer and the structured overview did not serve the purpose for which they were designed. That is, relevant subsuming concepts were not mobilized. Rather, the learning task was merely preceded by another learning task.

Classroom teachers might find the use of the structured overview preferable to the use of the summary paragraph type of advance organizer. The former allows the teacher greater certainty that he is relating the new learning material to subsuming concepts that have actually been previously learned by the students.

In constructing and presenting a written advance organizer, the teacher must make an educated guess about its appropriateness in terms of the learners' levels of ability and backgrounds of experience. The possibility always exists that the advance organizer may be dissociated from the students' existing cognitive structure, as seemed to be the case in Experiment 1. There is really no effective way for the teacher to know when this occurs since the students must read the advance organizer to themselves. The structured overview on the other hand, involves a discussion between teacher and students. Thus, the instructor is able to discern rather quickly appropriateness of his overview and to modify his presentation as necessary.

Further studies, both short range and longitudinal, should be carried out with regard to the following questions:

1. In what other areas of the secondary school curriculum does the structured overview appear to facilitate learning and retention?

2. Are there content areas in which the use of the structured overview seems to be unjustified?

3. What are the cumulative effects of the structured overview in particular content subjects?

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USE OF THE STRUCTURED OVERVIEW IN MATHEMATICS CLASSES

Richard A. Earle

Psychologists, reading specialists, and other instructional experts often recommend that students be prepared for new learning tasks by certain "readiness" activities. An analysis of specific activities suggests two different emphases with regard to readiness. The first emphasis is on the optimal organization of the student's prior knowledge as "learning sets" or "subsumers" in order to facilitate learning. This kind of activity is represented by the work of Ausubel (1968) and Gagne (1965). The second emphasis is on the exposure of the student to optimal amounts of the new learning task itself. The pre-teaching of important vocabulary and the setting of purposes for reading are examples of this latter type of activity (Five steps, 1960; Reading, 1965).

Unfortunately, experience suggests several problems with regard to preparing students for learning. First, activities of the learning set sort are difficult to understand and almost impossible to implement by the classroom teacher. Second, research results which show the efficacy of such activities as vocabulary pre-teaching and purpose setting are sparse and equivocal. In addition, nothing in the literature would support the use of one type of activity to the exclusion of the other. Finally, classroom translations too often take the form of disconnected pedagogic exercises which neither marshall the student's prior knowledge nor acquaint him with the task at hand.

The preceding papers by Barron and Barron, Estes, and Mills have introduced and explored the Structured Overview as a technique for combining the two schools of thought mentioned above. The remainder of this paper is devoted to a report of two "mini-studies" which represent continuous efforts toward both a clearer definition and a more thorough exploration of the Structured Overview as a readiness technique.

Samples

We selected two mathematics classes from each of our two Centers. From Jamesville-Dewitt, which serves a suburban middle-middle to upper-middle socio-economic class, we selected two ninth grade classes. These classes were judged by the administration to be "above average" in terms of achievement. On the basis of their performance in mathematics throughout the year (the mini-studies took place in

March and April), the teacher judged them to be comparable.

From Tully, which serves a rural lower-middle to middle socio-economic class, we selected two seventh grade classes. These classes were judged by the administration to be "average" in terms of achievement. On the basis of their performance throughout the year, the teacher judged them to be comparable.

Procedure and Treatment

In addition to the judged comparability of each of the two pairs of classes, we asked each teacher to construct a Content Pre-Test and administer it before beginning the treatment. We asked that this test be a representative sampling of the desired terminal behaviors. Selected test items are included in Figure 1. One class in each school was randomly designated as the Experimental group. Table 1 shows the Pre-test differences between the Experimental and the Control groups in each school.

Content Test

1. Write .125 as a per cent. __________
2. Find a ratio of 4 ft. to 2 yd. __________
3. 30 is 75% of what number? __________
4. Find the missing terms in $X : 3 = 6 : 18$ __________

Figure 1

Before the treatment began, we met with each teacher for three 45-minute planning periods. The treatment lasted 16 days at J-D and 13 days at Tully. While the experiment was in progress, we met for one 45-minute planning period with each teacher. At no time did we visit either the Experimental or the Control classes, since we felt that our presence might bias the results.

The Experimental treatment itself consisted of three parts. First, we asked each teacher to construct a Structured Overview of her unit. The instructions to the teacher were as follows:

1. Select every word that you intend to use in this unit that you think is necessary to the kids' understanding what you want them to understand.

2. Take the list of words (you may have 12 and you may have 50) and arrange them and re-arrange them until you have a diagram which shows the relationships which exist among the ideas in the unit, as well as their relationship to the semester's work and mathematics itself.

3. On the first day of the unit, write the diagram that you've made on the chalkboard. While you're doing this, explain why you arranged the words as you did and get the kids to contribute as much information as you can.

4. Throughout the unit, as it seems appropriate and comfortable, refer back to the Structured Overview. Sketch portions of it on the chalkboard if you wish. The object here is to aid the student in his attempts to organize the information in a meaningful way.

The Structured Overviews thus produced are presented in Figures 2 and 3.

Table 1

Content Test (Pre)

Source	Mean (Exp)	Mean (Con)	df	t
J-D (9th)	1.27	1.20	40	0.192 NS
Tully (7th)	4.00	3.73	59	0.394 NS

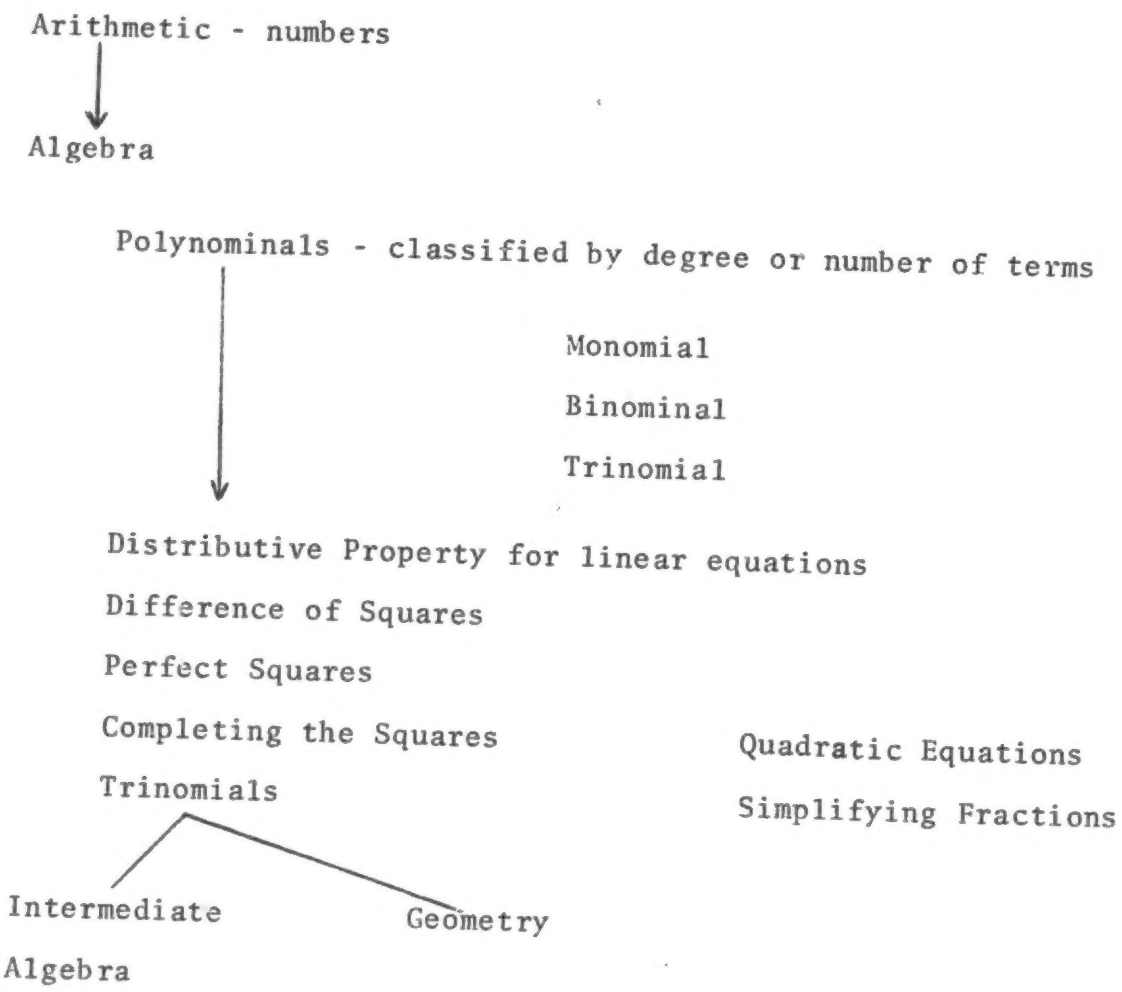
Second, we asked each teacher to pre-teach one or two words each day which she judged to be important to *that day's* lesson. The pre-teaching was done 8 out of 16 days at J-D and 8 out of 13 days at Tully. We asked the teachers to pre-teach words in terms of 1) the context in which they operate within the discipline, or 2) familiar, meaningful parts of words; for example, "poly" and "nominal."

Third, we asked each teacher to allow pupils to reflect on major sources of confusion in their homework assignments by arranging themsleves in small groups of two to five students. This was done 8 out of 16 days at J-D and 7 out of 13 days at Tully.

Both teachers agreed that the major difference between

Structured Overview - J-D

Factoring - Changing Form - from Addition to Multiplication



Arithmetic - numbers

Algebra

Polynominals - classified by degree or number of terms

Monomial

Binominal

Trinomial

Distributive Property for linear equations

Difference of Squares

Perfect Squares

Completing the Squares

Trinomials

Quadratic Equations

Simplifying Fractions

Intermediate Algebra

Geometry

Figure 2

their Experimental and Control groups was the Structured Overview. In the Control classes, the teachers gave a brief introduction to the unit which consisted largely of the work to be covered and the length of time they would spend on the unit. The teachers had been in the habit of explaining key words. They believed the only difference between Experimental and Control classes with regard to this aspect of the treatment was the timing; that is, the words were pre-taught in the Experimental groups, while in the Control group the words were taught as they came up during the lesson. The grouping activity was not new to either teacher, although it was accomplished more formally and more frequently during the study in the Experimental groups.

Findings

On the last day of the treatment, a Content Post-Test was administered to the four classes. In each case this test was identical with the Pre-Test, except that the items appeared in a different order. The differences in each school between the Experimental and the Control groups on the Post-Test are shown in Table 2.

Table 2

Content Test (Post)

Sources	Mean (Exp)	Mean (Con)	df	t
J-D (9th)	11.86	11.95	40	0.119 NS
Tully (7th)	14.03	14.00	55	0.035 NS

Despite the absence of statistically significant results, the teachers' reactions to the use of the Structured Overview were quite positive. One of the teachers made the following statement: "Preparing and using the Overview made my teaching easier. I knew exactly where I was going. I just can't believe that there are no differences. I *know* the Experimental group understands the unit better." This sort of frank post-hoc analysis led us to the construction of a test of meaning relationships. We worked with the teachers in constructing this Relationships Test. We drew the multiple-choice items from two sources: 1) understandings integral to the operations tested on the Content Test, and 2) relationships suggested by

Structured Overview - Tully

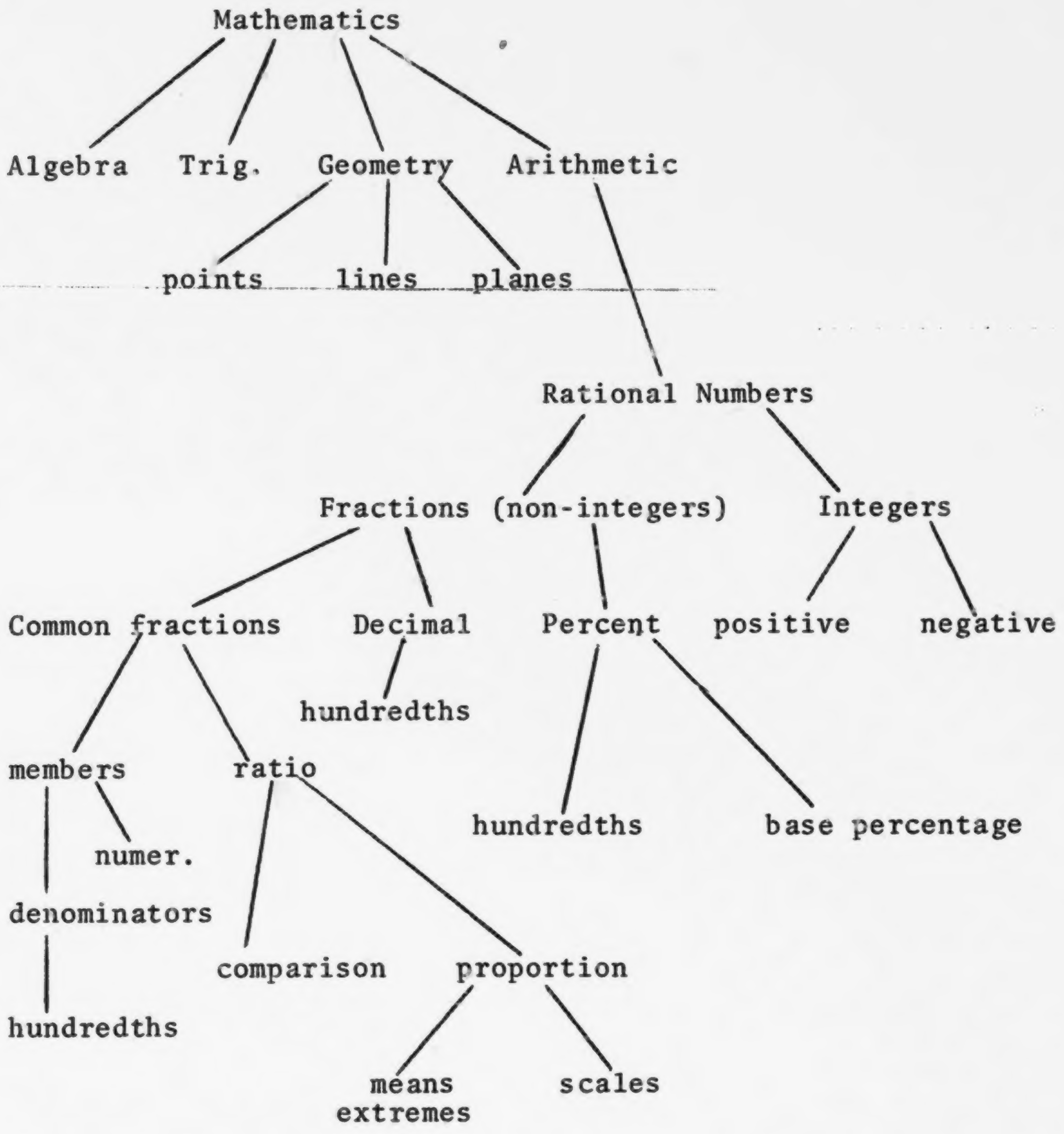

Mathematics
Algebra
Trig.
Geometry
Arithmetic
points
lines
planes
Rational Numbers
Fractions (non-integers)
Integers
Common fractions
Decimal
Percent
positive
negative
hundredths
members
ratio
hundredths
base percentage
numer.
denominators
comparison
proportion
hundredths
means
extremes
scales

Figure 3

γ

the teachers' construction of the Structured Overview. Samples of Relationship Test items are included in Figure 4.

Relationships Test

1. Fractions are in the part of mathematics that we call

    a. Algebra
    b. Arithmetic
    c. Geometry
    d. Trigonometry
    e. None of these

3. Which of these is the *opposite* of a fraction?

    a. common fraction
    b. decimal
    c. per cent
    d. integer
    e. none of these

6. Which is the best description of rational numbers?

    a. Integers and fractional numbers
    b. Ratios and proportions
    c. Numerators and denominators
    d. Decimals and percents

9. A proportion is

    a. a comparison
    b. a common fraction
    c. a non-integer
    d. a rational number
    e. none of these

Figure 4

The test of relationships was administered three weeks after the last day of instruction for the groups at J-D and two weeks after the conclusion of the experiment at Tully. The differences in each school between the Experimental and the Control groups on the Relationship Test are shown in Table 3.

In order to test the retention effects of the treatments, we scrambled the items on the Content Test once again and administered them to the groups. This test was given four weeks after the end of the experiment at Tully. The differences in

Table 3

Relationships Test

Sources	Mean (Exp)	Mean (Con)	df	t
J-D (9th)	12.32	10.78	43	2.026 ($p < .025$)
Tully (7th)	5.97	3.24	56	6.878 ($p < .001$)

each school between the Experimental and the Control groups on the Delayed Test are shown in Table 4.

Table 4

Content Test (Delayed)

Sources	Mean (Exp)	Mean (Con)	df	t
J-D (9th)	10.29	10.91	41	0.668 NS
Tully (7th)	13.41	10.10	56	3.170 ($p < .005$)

Limitations

1. The implications of our investigations thus far are limited by the extent to which the relationships shown by the Structured Overview are important to the learning of mathematics.

2. Another limitation is the fact that the Structured Overview was only a part of the Experimental treatment. The Overview could have interacted with the vocabulary pre-teaching and/or the small group discussion.

3. To this point, the investigation is limited by the reliability and validity of the measurement instruments used. The Relationships Test, for example, was a post-hoc effort which was constructed using the Structured Overview and the Content

Test as guides.

Conclusions and Implications

1. Both Experimental and Control classes learned the computation equally well in terms of immediate recall. The Experimental group at Tully appears to have retained the ability to compute somewhat better.

2. The Experimental group in each school learned more of the relationships that exist among the vocabulary terms than did its Control. It is not clear whether the Tully Control group learned *any* of the relationships, since their expected chance mean was 2.00, and the obtained mean for this group was 3.24. The J-D Control group appears to have learned some of the relationships, since their expected chance mean was 4.8 and their obtained mean was 10.78.

3. Students tend to learn what they are exposed to and tend not to learn what they are not exposed to. It is interesting to note that both teachers made up a Content Test which they later agreed was almost solely a test of computation. Therefore, it was not a "representative" sampling of the desired terminal behaviors, since the teachers had constructed the Structured Overview to correspond to their content objectives. One might conclude that the teachers did not test what they said they wanted to teach. Further, with regard to the Control classes, the teachers apparently did not teach what they intended to.

4. The Structured Overview, as described herein, may be a constructive and efficient way to provide readiness, vocabulary instruction, and goal clarification, all of which appear to facilitate success in learning mathematics. One might hypothesize that the Overview provides an integrated sort of readiness which extends into and throughout the content lesson.

Further mini-studies are planned to rectify the limitations identified thus far and to further clarify the concept of a Structured Overview. Eventually, the Structured Overview will be subjected to rigorous comparative experimentation.

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USE OF ADVANCE ORGANIZERS AND GUIDE MATERIAL IN VIEWING SCIENCE MOTION PICTURES IN A NINTH GRADE:

PILOT STUDY REPORT

Judith N. Thelen

This study will attempt to determine if the exposure of students to advance organizers (300-500 word passages which combine concepts to be developed in a film with previously introduced material) before the viewing of a motion picture and/or the use of study guides following the viewing will have an effect on students' attitudes towards motion pictures as instructional tools and their gain in knowledge of motion picture content.

The pilot study, using two of a series of seven Basic Earth Science films developed by the American Geological Institute and Encyclopedia Britannica Films, was conducted for the following reasons:

1. to validate the Likert-type attitude scale
2. to establish logistics for the study
3. to familiarize the teachers with treatment variables

Procedures

Four earth science classes of approximately 25 students each were used in the pilot study. Treatments were randomly assigned to classes. In the major study, students will be randomly assigned to treatment.

The basic design for the experiment can be illustrated in a 2 x 2 table:

	Guides	No Guides
Advance organizers	Treatment Group 1	Treatment Group 3
No Advance Organizers	Treatment Group 2	Treatment Group 4

Treatment Group 1 were given advance organizers five minutes prior to the viewing of a motion picture. After the motion picture was completed study guides were assigned as homework and were discussed in small groups the following day to resolve differences where they existed.

Treatment Group 2 were not given advance organizers but were assigned study guides after the motion picture. The guides were discussed in small groups, following the procedures of Treatment Group 1.

Treatment Group 3 were given advance organizers five minutes prior to the viewing of the motion picture but did not receive study guides following the viewing.

Treatment Group 4, acting as the control group, received no treatment other than viewing the film.

Instrumentation

Two content tests were developed by the experimenter for the motion picture. Tables of specification were constructed for each test relating the "content" element and the "behavioral" elements that the experimenter was interested in measuring. These behavioral dimensions incorporated the first three categories of the *Taxonomy of Educational Objectives* (Bloom, 1956). The content categories were selected by the science teachers involved in the experiment. The emphasis given to each content element in the test was determined by the percent of the total film time devoted to that concept.

A Likert-type attitude scale of 59 items was given to the students. From an item analysis, 20 items with a point biserial of $> .40$ were chosen to constitute the scale to be used in the study.

Analysis of Data

For the purpose of analysis the hypotheses are stated in the null form:

H_{01}: There will be no significant differences in post-test achievement scores between Treatments 1, 2, 3, and 4.

H_{01_a}: There will be no significant differences in post-test achievement scores between ninth grade groups using advance organizers prior to the viewing of a motion picture and ninth grade groups not using advance organizers.

H_{01_b}: There will be no significant differences in post-test achievement scores between ninth grade groups using study guides after the viewing of a motion picture and ninth grade groups not using study guides.

$H_{01}c$: There will be no significant differences in post-test achievement scores between ninth grade groups using a combination of advance organizers and study guides and ninth grade groups not using this combination.

Instruction for the first motion picture, *Erosion - Leveling the Land*, was based solely on study guides and small group discussion. Teachers did not discuss the guides in class. Group means on the content test did not vary for this motion picture. Table 1 shows the class variance and means; Table 2, the results of a one-way analysis of variance.

Table 1

Means and Variances of Experimental and Control Groups

Post Content Test, *Erosion - Leveling the Land*

Treatment	N	Mean	Variance
Study Guides (SG)	24	23.125	.78
Advance Organizers (AO)	25	23.68	.96
SG & AO	25	23.52	.56
Control	25	22.84	1.10
Total	99	23.29	.21

On the basis of these results, the science teachers suggested that perhaps the students already had sufficient knowledge of the film content and additional treatment was not necessary, or perhaps the structure of the motion picture was good enough to stand alone.

Thus, students were given the content test prior to viewing the second film *(Why Do We Still Have Mountains?)*. Since there

Table 2

Analysis of Variance for Experimental and Control Groups

Post Content Test, *Erosion - Leveling the Land*

Source	SS	d.f.	MS	F
Between	12.14	3	4.04	.19 NS
Within	1989.06	97	21.16	
Total	2001.20			

were 40 multiple-choice questions with 4 possible answers, the expected mean by chance was 10.

During the second showing, study guides were discussed in small groups and in addition were reinforced by whole-class discussion. Performance on the pre- and post-tests was measured by class means and variance as shown in Table 3.

Table 3

Means and Variances of Experimental and Control groups Pre and

Post Content Test, *Why Do We Still Have Mountains?*

Treatment	Pre			Post			Mean Gain
	N	Mean	Var.	N	Mean	Var.	
Study Guides (SG)	20	22.35	.76	22	26.59	1.34	5.44
Advance Organizers (AO)	26	23.00	.50	23	25.48	1.16	2.31
SG & AO	27	22.11	.60	25	26.60	.66	4.00
Control	25	22.48	.97	25	25.00	1.22	3.19

Hypotheses testing on the second film was done with a two-way analysis of variance, the results of which are shown in Table 4.

Table 4

Two-Way Analysis of Variance for Experimental and Control Groups

Source	SS	df	MS	f
Rows	29.392	1	29.392	2.07
Columns	92.000	1	92.000	6.49 *
Interaction	1.565	1	1.565	.11
Error	1246.783	88	14.167	
Total	1369.740	91		

$p < .05$

Results and Conclusions

Analysis of the data rejects the hypothesis of no significant differences between groups using study guides after the viewing of a motion picture and groups not using study guides.

Pre-test scores on the second film suggest that students had prior knowledge of the content of the film. Mean gain scores, however, suggest that prior content knowledge was not an important factor. Therefore, as originally proposed, provision for post-testing only will be included in the main study.

In accordance with the proposal, one content test will be given after each film. In addition, an overall content test will be administered at the conclusion of the experiment. If possible, the experimenter will establish the reliability of this test prior to its administration to the experimental population.

USE OF PREPARED GUIDE MATERIAL AND SMALL GROUP DISCUSSION IN READING NINTH GRADE SOCIAL STUDIES ASSIGNMENTS:

PILOT STUDY REPORT

Thomas H. Estes

The problem to be considered by this study is to determine if the use of guide material in the reading of social studies assignments and subsequent small group discussion of this reading will have an effect on students' attitudes toward social studies, their knowledge of social studies, and their general reading comprehension.

The pilot study to be reported here was conducted for three reasons: 1) to iron out procedural problems before the beginning of the main study, 2) to familiarize teachers with the treatment variables, and 3) to allow everyone involved to know as much as possible about the experiment before the start of the main study. The procedures, design, and analysis of the data were essentially the same as were originally planned for the main study.

Statistical results of the pilot will be reported first. Following this the procedural changes suggested by the study will be discussed.

Statistical Results

Hypotheses for the study are to the effect that the three groups (one using study guides plus small group discussion, a second using study guides alone, and a third using purpose-setting questions) will differ on three criteria - gain in general reading comprehension, change in attitude toward social studies, and social studies achievement. Tables of analyses follow. They serve as examples of those to be presented in the main study. Though inconclusive, results of hypothesis testing did serve as partial basis for revision of the main study.

Tables 1-3 present the analyses conducted as tests of the main hypotheses of differences over treatments. Tests for differences between any two treatments in any variable were not permitted under conditions set by the proposal. Tests of any pair of the six subhypotheses were dependent on a significant F test (.05) in the associated analysis of variance for the main hypothesis.

Though probability levels associated with treatment differences did not reach the required level of significance, treat-

Table 1

Analysis of Variance for Experimental and Control Groups: China Unit Test

Source	df	MS	F	P
Teachers (A)	1	348.42	2.57	0.11
Treatments (B)	2	295.80	2.18	0.11
A x B	2	62.23	0.46	0.64

Note: Analysis done on post test scores.

ment differences did reach the 0.11 level for one measure, the content examination. Inspection of the specific group means associated with this measure reveals that the mean for Experimental Group 1 (guides plus small group discussion) is larger than that for Experimental Group 2 (guides alone) which is in turn larger than that of the Control group (purpose questions).

Table 2

Analysis of Variance for Experimental and Control Groups: A Scale to Measure Ninth Grade Students Attitude Toward Social Studies

Source	df	MS	F	P
Teachers (A)	1	166.44	0.23	0.64
Treatments (B)	2	261.21	0.36	0.70
A x B	2	321.55	0.45	0.65

Note: Analysis done on change scores based on pre-post test differences.

On a scale to measure ninth grade students' attitudes toward social studies, group means aligned themselves in opposite fashion. The slight differences which did exist favored the Control group over Experimental Group 2 and Experimental Group 2 over Experimental Group 1.

The three group means for the high school reading test aligned in the same fashion, though in this case the chance probability levels associated with the small differences were much higher than for the content test.

Table 3

Analysis of Variance for Experimental and Control Groups:

Stanford Achievement Test - High School Reading Tests

Source	df	MS	F	P
Teachers (A)	1	5173.76	5.12	0.02
Treatment (B)	2	328.17	0.33	0.73
A x B	2	441.96	0.44	0.65

Note: Analysis done on change scores based on pre-post test differences.

One of the assumptions made in this study was that pretreatment equivalence existed between groups, despite the fact that true randomization could not be said to have operated in assignment of subjects to groups. To partially satisfy the question of whether some differences might have existed between the groups prior to treatment, a one-way analysis of variance was conducted to test for differences among the classes with respect to general intelligence as measured by the Lorge Thorndike. Results of this analysis are reported in Table 4. Indication is that only slight, non-statistically significant differences existed between pretreatment groups, supporting the assumption of pretreatment equivalence between groups.

Table 4

Analysis of Variance for Experimental and Control Groups:
Lorge-Thorndike Intelligence Test

Source	df	MS	F
Between Groups	5	73	.66

Table 5 reports differences between sexes with respect to means on the three criterion variables. Within the cells of this table are recorded the number of classes under each treatment representing either one of two contingencies: girls' mean greater than boys' or boys' mean greater than girls'. For example, with respect to Variable 1, gain on the Stanford reading test, the boys' mean was superior to the girls' in both Experimental 1 classes; in one Experimental 2 class, the boys' mean reading gain was superior to the girls', whereas in the other the girls' was superior to the boys'; and in both control classes, girls' means associated with this variable were superior to boys'.

In the main study, where almost twice as many classes will be involved, this table should be even more interesting. If the sex difference trend suggested in the pilot is magnified by the main study, this should be of concern to later similar research.

TABLE 5

Comparative Number of Sex Differentiated Means Favoring One or Another Sex Under Each Treatment on Three Variables

Treatments	Variables	Contingencies	
		Girls' Mean Boys' Mean	Boys' Mean Girls' Mean
Exp 1	Var 1	0	2
	Var 2	2	0
	Var 3	0	2
Exp 2	Var 1	1	1
	Var 2	2	0
	Var 3	0	2
C	Var 1	2	0
	Var 2	1	1
	Var 3	1	1

Note: Var 1 = gain on Stanford reading test; Var 2 = gain on Attitude Scale; Var 3 = Context Knowledge.

Procedural Changes

One variable originally planned for consideration was the classroom climate each teacher tends to create. This was to be measured by the Flanders system of interaction analysis. The intent was to use this information to help explain possible large interaction factors or significant differences between teachers on criterion variables. This will remain the plan in the main study, with one technical revision. Tapes of classroom interaction for each teacher for each condition, repeated over time, were to be made and later analyzed by means of the Flanders system. The physical nature of the classrooms used in this study, however, obviated the possibility of this being done by simple means. Arrangements have therefore been made for the interaction to be analyzed as it occurs in the classroom. Unfortunately, limitations of time meant that this could not be done in the pilot.

A second procedural change for the main study involves use of the Stanford high school social studies test. For reasons of time, this instrument was not used in the pilot study; and this is one reason it will be eliminated from the main study. More importantly, however, it is felt that the experimenter-constructed examination over the content of the social studies unit is a superior criterion for the variable of content knowledge gain. The standardized instrument would probably add little information.

A standardized instrument will, however, be utilized in one way. Students' performance on a general test of social studies knowledge should logically be related to their performance on a social studies unit test. Subjects' scores on the social studies subtest of the Iowa Test of Educational Development will therefore be correlated with unit test scores. This will hopefully establish concurrent validity for the unit test. It will not involve testing as a part of the experiment since the measures will have been taken as a part of school-wide testing three months prior to the beginning of the main study. Scores will be available in students' cumulative record folders.

A third change which should be mentioned is that one of the experimental teachers trained by the pilot study will not be with the school system for the coming year. A replacement for this teacher has been secured, and he has agreed to participate in the experiment.

The fourth and final procedural change which should be discussed involves the manner in which the guide material was utilized in the classroom. The procedure in the pilot study called for pupils to work with the guides only as part of homework or in small groups. Teachers never discussed the guides in class. In the case of controls, teachers did not discuss in class the questions pupils had to accompany the reading. Whatever instruction the experimental pupils received surrounding the concept of three levels of comprehension was, therefore, provided solely by the guides and/or small group discussion with no whole class follow-up or reinforcement. For the controls' training this was also the case. An attempt was made to keep all teacher-involved class discussion the same regardless of treatment.

However theoretically sound this may have been from a design point of view, in reality such a procedure did not allow for maximum efficacy of treatments. This judgment is based on two factors: 1) comments of pupils derived from interviews and written evaluations, and 2) empirical data, reported above.

Two pupils' comments occurred frequently. One was that though they felt that literal understanding was important and would later appear on a test, interpretive or applied kinds of understanding did not seem important and probably would not later appear on a test. The second and third level guides seemed to pupils to be academic exercise, of no import to the objectives of a social studies course. And indeed, except as they appeared in guides, higher levels of understanding were not emphasized in the unit. The point brought into vivid focus by the pilot is that study guides are not alone sufficient to change pupils' habits of dealing with written material. The procedural change suggested is that training provided by guides be reinforced and extended by whole class discussion.

Such discussion should have two purposes: First, it should reinforce major concepts developed as students move through the three levels, with discussion based on understanding beyond the literal, centered particularly at the application level. Second, the discussion should reinforce students' awareness of the comprehension process exhibited in the three levels (information, ideas, application). Simply stated, comprehension process should be made a more integral part of the social studies course.

Control pupils will engage in classroom discussions for comparable time. Their discussion will be initiated by the guiding questions they use with their reading.

DEVELOPING AND USING STUDY GUIDES

Richard A. Earle

The development and use of study guides is as much a philosophy of teaching as a specific teaching practice. This discussion will set forth the underlying theory insofar as it is necessary. Our main purpose, however, is to describe the actual construction and use of study guides as a teaching practice.

Throughout, we will be using the terms "content" and "subject matter" as synonyms. For our purposes, "content" or "subject matter" is defined as the information, ideas, and concepts which make up an area of knowledge. We will use the term "process" repeatedly. "Process" refers to what people *do* with information; that is, the reading and thinking necessary to the acquisition and application of content.

There are three basic tenets which will serve as the foundation of our discussion:

1. The subject matter we teach is less important than the process of acquiring, interpreting, evaluating, and applying that subject matter.

2. Each person possesses different kinds and amounts of content, and different styles and abilities with regard to process.

3. Active participation is necessary for the effective learning of both content and process.

Evidence of these basic beliefs will appear throughout our discussion. As described here, study guides offer *one* practical and effective means of incorporating these beliefs into the art of our teaching.

Study guides have proved valuable in various ways. This author found that both teachers and students reacted favorably to their use in a small central school in a rural area of central New York. Durrell (1956) reports that their use resulted in improved comprehension and retention, and increased interest and attention to study tasks. Sanders (1969) discusses their contribution to social studies learning in a class of poor readers. On a standardized test of physics content, Herber (Vine, 1967, p. 275) found statistically significant differences in favor of students who had been provided with study guides. More information will be available as a result of research now in progress at Syracuse University.

The purpose of this discussion, then, is to provide initial direction which will permit any teacher to develop and use study guides in his classroom.

Definition of Study Guides

A study guide, as the name implies, guides a student through a reading assignment, focusing his attention on major ideas and directing his use of the necessary reading-thinking processes. It is written and used in such a way that the student's mastery of subject matter and his proficiency with the process are simultaneously ensured and increased. Herber (1967) has offered the following description:

> These guides help the students apply skills in such a way that they are conscious of the process involved in the skill and are also aware of the concepts being developed and applied. (They) are so constructed that, in one class, students can react to the same material at different levels of comprehension, thereby serving the levels of ability and achievement represented in the class. (Study guides are) designed to serve as the basis for reading to and discussion of the major concepts of the unit being studies [p. 101].

Vine (1967) characterizes study guides as, "...a paper-and-pencil version of the type of inductive thinking through which you might take an entire class in an oral discussion [p. 277]." He adds that study guides have an advantage in that each student is allowed to participate in each step of the thinking process.

Implicit in these definitions is the fact that study guides do not assume a standard form. Rather, each guide's physical appearance is dictated by the steps necessary in its development. Let us assume that we have decided to develop and use a study guide to assist our students with some required reading. How do we proceed?

Development and Use of Study Guides

To date the best and most complete explanation of the construction and use of study guides has been provided by Vine (1967). A forthcoming book by Herber (1970) describes the step-by-step process in considerable detail. Let us survey the task briefly.

First, we analyze the assignment for *content*. Keeping our content objectives clearly in mind, we examine the material carefully to decide what information we wish to emphasize. Second, we analyze the assignment for *process*. We decide what people do with this information, how it is organized, and what particular reading-thinking skills are necessary. Third, we decide how much *assistance* we should provide for individuals within the class. We consider the students' competencies, the difficulty of the assignment, and the level of understanding we expect the students to attain. Fourth, we *construct* the study guide, incorporating the decisions made in the first three steps. (Although the form of the guide will largely result from these decisions, we may examine sample study guides as models.) Fifth, we use the study guide in the context of a *well-planned lesson*. We show the student how to use the student guide and familiarize him with the process. After the guide is completed, we put the student to work with a group of his classmates, elaborating and verifying his mastery of both content and process.

We will describe these steps more fully as we consider them in order throughout the remainder of this discussion.

Analysis for Content

The decisions begin. The selection of content is properly considered to be the responsibility of the subject matter teacher. The teacher, as the subject matter specialist, should have his overall content objectives clearly in mind. Certainly the subject matter selected for emphasis will be characterized, as far as possible, by the following:

1. It is interesting to the student.

2. It is significant to the discipline.

3. It is broadly applicable outside the discipline.

4. It is important in terms of its potential for attacking the problems and issues of the present and the future.

Using these or similar criteria as guidelines, we now decide what information we want the students to "get" from the assignment. A sound approach is to read the assignment critically, marking portions of the text which contain the subject matter we wish to emphasize. Comments may be jotted in the margins. We may wish to write a summary of the information to be gained from the assignment, although underlining or otherwise marking the information in the text itself will prove helpful in subsequent steps.

In this initial step, it is important to know not only what to emphasize, but what to delete as well. With the myriad information now available in every conceivable area, and more being produced every minute, this is likely to be a painful decision. But the decision must be made. With the exception of some imaginative literature, much that is published is going out of date by the time it reaches the reader. Many textbooks are poorly written, or contain uneven treatment of topics within the discipline. In addition, the thoughtful teacher rarely expects the student, however capable, to assimilate everything that the textbook offers. Hence, we must not be afraid to strike out portions of the text which do not conform to our well-considered criteria for inclusion. Implicit here is that mere coverage of the text is not justifiable. A few important topics, thoroughly studied, seem more likely to produce productive thinkers than is a great deal of superficial coverage.

In short, we have considered our content objectives long and carefully, We have deleted portions of the assignment which did not fit these objectives. We have underlined or otherwise indicated the information within the assignment which we wish to emphasize. Now we are ready to continue our analysis to include the process involved in acquiring and handling the information.

Analysis for Process

The first step in our search for the process is to describe the assignment in terms of what people *do* with the information. Here we find an understanding of Levels of Comprehension to be most helpful. The three Levels of Comprehension are outlined by Herber (1968) as follows:

Level I: *Literal Understanding* - the identification and recall of factual detail; knowing what the author said.

Level II: *Interpretation* - inferring significant relationships among the details; knowing what the author really meant.

Level III: *Application* - formulating generalizations or developing abilities which extend beyond the assignment; intellectual or physical use of the understandings.

Within a given assignment, handling the information becomes more difficult as we proceed from literal understanding to application. It is necessary to master the information at one level before we can achieve the next level.

Thus, a major factor in identifying the necessary reading-thinking process for this assignment is to decide what understandings are apparent at each Level of Comprehension.

The next step is to describe the information in terms of a discernible pattern of organization. Niles (1964) has discussed four organizational patterns which occur commonly: simple listing of details under a main topic; cause and effect; comparison and contrast; and sequence or time order. Robinson (1966) has asserted that poor readers who are assisted in identifying patterns such as these and setting purposes in terms of these patterns will "reap benefits they never felt were achievable." In working with content teachers, this author has found that information marked for emphasize during the analysis for content almost always can be described in terms of one of these four patterns of organization.

Finally, in reading our assignment carefully, we make note of any particular reading-thinking skill we feel is important to acquiring, interpreting, evaluating, and applying the information. Of course, there are literally hundreds of "sub-skills" which contribute to the process of acquiring and handling information. The observations of this writer, however, indicate that careful attention to the Levels of Comprehension, including the four organizational patterns, will provide considerable success in identifying a productive approach to the study of the assignment.

An example or two may help to clarify our understanding thus far. Chapter 3 in our social studies textbook discusses China's history from the Industrial Revolution to the formation of the Chinese Republic. In our analysis of content, we decide that this assignment fits our content objectives. We delete two sections of the chapter that are unimportant in terms of our purposes. We indicate the chain of events which led to the formation of the Republic. We want our students to locate, identify, and recall these details (Level I). Does the organization reflect one of the four common patterns? Yes. As content teachers, we recognize that there are significant cause and effect relationships among the details (Level II). Although Mao Tse-Tung is not mentioned in this chapter, we speculate on his reactions to the exploitation of China during this period. We formulate a generalization, based on this interpretation and other knowledge, as to how these events continue to influence China's foreign policy (Level III).

Another example. We wish to teach the poem "Fire and Ice" by Robert Frost. We decide that there is no clearly indicated pattern of organization (we *might* have concluded that the poem reflects a comparison and contrast of "fire" and "ice" as destructive elements). We therefore decide to stick to our three Levels of Comprehension. The process becomes one of selecting details that indicate the author is speculating as to how the world might be destroyed (Level I). We note that he is employing "Fire" and "Ice" as symbols, representing love or desire and hate. These significant relationships among the details represent interpretation (Level II). The total work leads us to conclude that extremes are dangerous, or that love and hate are equally effective as destructive agents (Level III).

In summary, we have formulated our content objectives and used them as criteria in the selection of the assignment. We have identified the information within the assignment that we wish to emphasize, deleting that which was not consonant with our goals. We have described the information in terms of what people can do with it at each of the three Levels of Comprehension and of one of the four common patterns of organizing thoughts. Now we must consider the content and process in relation to the students' ability and achievement -- the idea of providing different amounts of assistance.

Providing Assistance

Obviously, if the entire class is able to handle the information at all three Levels of Comprehension, no study guide is needed. We are concerned with clusters of students within our class who require assistance in completing the assignment.

Two factors provide the basis for differentiating the assignment: 1) the students' competencies, and 2) the difficulty of the material. Because time and space do not permit a lengthy discussion of the topic, suffice it to say that through the use of standardized tests, informal inventories, and our own observations, we are likely to have a fairly good understanding of our students' reading and subject matter competencies.

Ideally, of course, each student will be operating with material that is suited to his instructional level. We know, however, that this ideal is rarely the case. Most content classrooms boast a single textbook, often too difficult for the student to read with the required degree of understanding. It is in this situation that the study guide is especially helpful.

There is no formula which allows us to differentiate our assignments perfectly. Our knowledge is simply inadequate. Our best resource may be a sensitivity to the amount of success each student is experiencing. If, for example, the student is unable to achieve literal understanding (Level I), we must include in our study guide assistance for him in locating and selecting details. We may even select single words from the assignment and ask him to manipulate them in some way. We might provide him with aids in locating the desired information, such as the page and/or paragraph numbers. Or we could provide him with some of the details and direct him to specific pages in the text, where he could check their accuracy and locate other information.

Assistance at the second Level of Comprehension might consist of supplying a conclusion and asking the student to support or refute it. A group of alternatives might be provided, the student's task being to choose those which he can support from the assignment. We might also ask the student to use the same details to support different points of view. Finally - the most sophisticated task - the student can be expected to describe the significant relationships in his own words.

At Level III, assuming competence at the preceding levels, we can give the student practice in applying his knowledge to physical or intellectual problems. Using his understanding at the literal and interpretive levels, we can ask him to create a physical or verbal model. Here, too, we might provide alternative generalizations, requiring him to support his choices from the present assignment as well as from other sources. Without assistance at this level, the student would be expected to formulate independent generalizations or solutions which extend beyond the scope of the immediate assignment.

It seems dangerous to attempt a generalization about what does or does not constitute assistance in varying degrees. One thing is certain. We will learn a great deal about our individual students as we use study guides to assist them in their study tasks. Study guides have a considerable potential as diagnostic teaching tools.

Thus, we see that the amount of assistance we provide in our study guides will depend on our judgment as to how the competencies of our students relate to the difficulty of the reading assignment. Given this relationship and the fact that we are sensitive teachers, we can vary the amount of assistance provided to ensure success for each student in our class.

Construction of Study Guides

At this point we have developed a study guide. All that remains is to put it in print. As mentioned earlier, a study guide assumes no standard form. There are, however, a few rules of thumb which might be offered:

1. Avoid crowding too much print on the pages of a study guide. This tends to overwhelm students, particularly those who are operating at Level I.

2. Be sure that the guide reflects both content and process.

3. Make the guide different and difficult (Vine, 1967). Require students to locate, verify, or otherwise manipulate information so that they remain active participants in the assignment.

4. Obviously not every study guide will be entirely successful. The important point is to pick a short reading selection, make a study guide, and try it out.

The appendices contain samples of study guides which have been used successfully. Appendix A is an example of a guide which was used with an "average" eighth grade class. Note the constant focus on "world power" as a concept. Process was described in terms of the Levels of Comprehension. Questions representing the levels were assigned to different groups within the class, thus differentiating the assignment.

Appendix B focuses on a portion of China's history. The process was defined as Level II, the significant cause and effect relationships. The teacher judged the class to be competent in literal understanding. He decided that the group needed some guidance in organizing and interpreting the complicated description of the long chain of causes and effects provided in the text.

Appendix C is a model study guide for the poem "Fire and Ice." The content objectives and the process have been used to construct a short guide at each of the three levels. With one class, the teacher divided the class into groups and provided each group with a guide at the appropriate level. In another class, the teacher asked the whole class to use all three guides as a demonstration of process in poetry.

Appendix D was used to help tenth graders comprehend the structure and function of the kidneys. A description of the assignment revealed significant relationships among the details with regard to sequence. The guide is not differentiated since the teacher felt that none of the students had difficulty at Level I, though most of them could use the guidance at Level II.

Appendix E was used with a seventh grade class of very limited ability and achievement. This guide reflects a constant focus on content, as well as a single skill. Constant and detailed direction was given throughout the assignment.

Our final example, Appendix F, is part of a guide used with an advanced group of high school seniors. The teacher was aware of their competency at Levels I and II, but prepared this guide to aid the students in extending their understandings beyond the assignment.

Use of Study Guides

Study guides are most effective when they are used as *one* element of a well-planned lesson. Many authorities recommend that the teacher 1) prepare the student for a reading assignment by pre-teaching difficult vocabulary and setting purposes for the reading, 2) guide the students' reading, and 3) provide for discussion or other follow-up of the reading. The Instructional Framework outlined by Herber (1970) seems to incorporate most of these recommendations:

1. Motivation - arousing interest in the topic
2. Background information - supplying necessary content not contained in the reading assignment
3. Review - pulling together previously studied content necessary to the meaningful study of the assignment
4. Vocabulary - pronunciation and/or definition of words and terms essential to the assignment
5. Anticipation - setting reasonable purposes for the reading
6. Direction - identifying and providing practice in the process necessary to the reading assignment
7. Guided reading - providing a study guide which allows the student to practice the process as he masters the content

8. Guided reaction - providing an opportunity for the student to verify and elaborate his grasp of both process and content

Of course, these "steps" are not meant to indicate a rigid sequence. In practice, some may be omitted. Two or more steps may be completed simultaneously. However, the Instructional Framework does provide the teacher with usable guidelines for the planning of instruction. We shall use our study guide in this context.

Since the effective use of study guides is most intimately connected with Direction, Guided Reading, and Guided Reaction, let us discuss these three steps briefly. Direction (step 6) is a few minutes spent on familiarizing students with the process necessary to the successful study of the assignment. One efficient means of accomplishing this task is to "walk through" the first portion of the guide with the students. This will acquaint them with the directions printed on the guide itself; more importantly, it will make them aware of the relationship between process and content. With this Direction, they will be better prepared to use the study guide, which of course directs them through the same process throughout the assignment.

The study guide can be used to guide students' reading in the classroom. However, it is probably most often used to guide the reading of homework assignments, since it will make the difference between guided study and frustration.

When completed, a study guide has served only half of its potential effectiveness. It is tailor-made to serve as a structure for active reflection on the content. By arranging the students in groups of from three to five, we can encourage them to resolve any differences they may find in their responses. This gives each student the opportunity to test his mastery of both process and content. This sort of Guided Reaction very often results in lively elaboration, purposeful questioning, and rereading for verification.

One observation. We often condition students to believe that any form of collaboration is cheating. They may therefore initially be threatened or even amused by group reflection. It is important to incorporate this activity gradually, making certain that students know exactly what they are to do, and allowing them only a few minutes for group reflection at first. They will soon learn that there is a great deal of value in this kind of activity.

Conclusion

This discussion is based on three beliefs:

1. We must teach the process of handling information as well as the information itself.

2. We must offer different amounts of assistance to students with different backgrounds and abilities.

3. We must encourage our students to become active participants in learning rather than passive observers of teacher behavior.

We are in need of people who can *do* things with information, who are enthusiastic learners and independent thinkers. Study guides offer one partial solution to this need.

APPENDIX A

The Story of America, by Eibling, et.al.

Study questions for pages 478-482.

Directions: Answer *only* the questions that your teacher assigns. These questions will help you by giving you a guide and a purpose for your reading of this assignment.

* 1. What should a nation have in order to become a world power?

* 2. Why do world powers try to rule other countries?

** 3. Considering the definition of "world power" on page 478. How did the five areas mentioned on pages 480-482 help the United States to become a world power?

**
*** 4. Considering the information on page 479, column two, try to describe *exactly* the Monroe Doctrine.

*** 5. What was the Monroe Doctrine? (p. 356 in your other text)

*** 6. Considering America's expansion as described on pages 480-482, how would each of the following feel about the United States?

the average U.S. citizen:

the queen of Hawaii:

U.S. government and military leaders:

the leaders of other world powers:

the English:

the Germans:

a native living on Pago Pago:

When you have found the information called for above, you will share the information with the rest of the class.

APPENDIX B

The Two Chinas, by Bell

Study guide for pages 50-61

Do Not attempt to complete this study guide until you fully understand the directions!

Directions: This section of Chapter 3 presents a series of causes and effects. One event causes another event, whereupon the second event causes another thing to happen, and so on. One might say that all of history is a series of causes and effects. The purpose of this study guide is to help you recognize and comprehend more effectively material which is presented in this way. Your study guide is divided into six boxes. In each box there are five statements, each of which is a cause *and* an effect in China's history. Begin with the box marked "A". "Industrial Revolution in Europe" is marked "1". Move to box "B". Because the Industrial Revolution in Europe caused an increased desire for trade with China, that statement is marked "2". Now move to box "C". Find the effect of the increased desire for trade with China, and number it "3". Move all the way through to box "F". The statement you mark as number "6" in box "F" should be the *effect* of number "5" in box "E" and the *cause* of number "7" in box "A". If you continue numbering through the boxes five times, you should get the "picture" of the series of causes and effects in this period of China's history.

A

1 Industrial Revolution in Europe.
25 Tsu Hsi still refuses to Modernize China.
19 Japan and the West continue humiliation of China.
13 Food production fails to equal population growth.
7 Chinese defeated.

B

2 Increased desire for trade with China.
___ Chinese became aroused against foreigners.
___ "Unequal treaties"
___ Manchu government unable to protect China during Russo-Japanese War.
___ Famines ravage China.

C

___ Trade with China increases, including opium traffic.
___ Boxer Rebellion.
___ Manchu government collapses.
___ Foreign countries granted "concessions" in colony-like China.
___ Taiping Rebellion.

D

___ Chinese officials become alarmed.
___ China weakened still more.
___ Chinese people realize government needs reorganization.
___ Domestic war preoccupies imperial government.
___ High tariff rates protect foreign "concessions".

E

___ 20,000 chests of opium are destroyed.
___ Foreign powers begin quarrel over division.
___ Revolution is successful - young emperor abdicates.
___ China becomes unable to protect her own manufacturers.
___ British and French troops occupy Peking.

F

___ Opium War (1840-1842).
___ More opportunity for extraterritoriality.
___ Open Door Policy raises hope for revival of China.
___ China becomes weaker and more impoverished.
___ Chinese Republic is formed.

APPENDIX C

Fire and Ice, by Robert Frost

Literal Level of Comprehension (Level I)

Directions: After reading the poem, select the best literal summary from the following. Check your choice.

_____1. The author suggests that while death by fire or freezing are equally unpleasant, he would prefer fire.

_____2. The author has experienced unrequited love so often that he wishes to die.

_____3. The author speculates on the relative merits of world destruction by fire and by ice.

_____4. The author states that if he had to die twice, either fire or ice would do the job.

Interpretation of Symbols (Level II)

Directions: Symbolism is usually employed by an author when he wishes to state an abstraction in concrete terms. Below are several terms which "fire" and/or "ice" might symbolize *in this poem*. If a term is symbolized by "fire", write "F" in the blank before it. If a term is symbolized by "ice", write "I" in the blank. You may use as *many* or as *few* of the terms as you wish; however, you must be able to justify your choices.

_____ humanitarianism

_____ nuclear explosion

_____ fire

_____ destruction

_____ hate

_____ sexual desire

_____ violence

_____ ice

_____ (other)_______________

_____speed

_____bias

_____isolation

_____love

_____death

_____prejudice

_____non-communication

_____extremism

Interpretation of *Total Work* (Level III)

Directions: Select the statement below which best expresses the total meaning of the poem. If you wish, you may select more than one statement. You must be able to justify your choices.

_____1. Extremes are dangerous.

_____2. Hate and love are equally effective at destroying.

_____3. Nuclear holocaust will end the world before another Ice Age.

_____4. Unreasoning violence stands the best chance of destroying or incapacitating mankind.

_____5. You only live once.

_____6. The spirit of man is deadened by isolation.

_____7. Refusal to obey the Ten Commandments will mean the end of the world.

_____8. (Other)_______________________________________

APPENDIX D

Modern Biology, by Otto and Towles

Study guide for pages 593-597

Directions: For each of the three activities below, you will find a purpose and a reading skill stated. Complete each activity keeping both in mind. It should help keep your mind active while you achieve some understanding.

1. Purpose: Read pages 593-594 to discover the *sequence* of waste removal from the body. Then list these five terms in the proper sequence:
excretory organs, lymph, cell, outside, blood.

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

2. Purpose: Survey pages 593-597 to make a *list* of the excretory organs mentioned in this section. List them below.

1. ____________________
2. ____________________
3. ____________________
4. ____________________
5. ____________________

3. Purpose: As you read pages 594-596, note the *structure and function of the kidneys* in the removal of waste from the blood. *Classify* the terms below with regard to the *process*. Some terms will fit under more than one heading.

glucose
cortex
99/100
nephron
pelvis
urethra
nitrogenous waste
glomerulus
tubules
collecting tubule
correction
Bowman's capsules
ureter
reabsorbtion
urine
water
Renal artery
arterioles
excess
minerals
bladder

Blood Enters	First Stage	Second Stage	Waste Leaves

APPENDIX E

Science You Can use, by Stone and Stephenson

Study guide for pages 12 and 13

Directions: A *fact* is a belief that has been proved. A *fable* is a belief that is *not* true. Part of your job as a good reader is to decide whether information is fact or fable.

For each of the following, read the paragraph on the page that is indicated (2, 12 stands for second paragraph on page 12) and decide whether the statement is fact or fable. Then write fact or fable in the space.

2,12 1. The chameleon can change its color to match its surroundings. FACT

2.13 2. Milk snakes feed mostly on mice. ______

4,12 3. Skinks sit on their eggs to keep them warm until they hatch, like hens do. ______

1,13 4. The rattlesnake always rattles before it strikes. ______

3,12 5. The glass snake is not a snake. It is a lizard. ______

Now list *three* more *facts* from your reading. The paragraph and page number is shown for you. Write as neatly as you can.

1,12 1. ______________________________

____

2,13 2. ______________________________

4,12 3. ______________________________

Now list *three* more *fables* from your reading. The page and paragraph number is shown for you. Write as neatly as you can.

3,13 1. ______________________________

1,13 2. ______________________________

2,13 3. ______________________________

APPENDIX F

Huckleberry Finn, by Mark Twain

Reasoning guide for Chapters XVII and XVIII

Directions:

Huck, like all of literature, is not real. He is an instrument of his creator -- Twain. Through Twain's literary technique, Huck's simple impressions of people and events (Appearance) often provide a powerful contrast to the reader's evaluation (Reality).

Listed below are several statements from Chapters XVII and XVIII. For each statement, determine the contrast between Appearance and Reality by choosing one comment from Group 1 and one comment from Group 2. You are free to make comments of your own by marking "5" from Group 1 and/or "E" for Group 2. Be prepared to justify your decisions. The first one is done for you.

Group 1

Huck perceives an Appearance of:

1. personal quality
2. social quality
3. artistic quality
4. spiritual quality
5. other

Group 2

The author has projected, in Reality:

A. A realistic portrayal of the false values of men

B. An exaggerated portrayal of the false values of men

C. A realistic portrayal of the true values of men

D. An exaggerated portrayal of the true values of men

E. Other

	Group 1	Group 2
1. Then the old man said he hoped I wouldn't mind being searched for arms, because he didn't mean no harm by it -- it was only to make sure. So he didn't pry into my pockets, but only felt outside with his hands, and said it was all right. He told me to make myself easy and at home...	1	B

Group 1 Group 2

2. On the table in the middle of the room was a kind of a lovely crockery basket that had apples and oranges and peaches and grapes piled up in it, which was more redder and yellower and prettier than real ones is, but they warn't real because you could see where pieces had got chipped off and showed the white chalk, or whatever it was, underneath. ______ ______

3. Everybody was sorry she died, because she had laid out a lot more of these pictures to do, and a body could see by what she had done what they had lost. ______ ______

4. She didn't ever have to stop to think. He said she would slap down a line, and if she couldn't find anything to rhyme with it would just scratch it out and slap down another one, and go ahead. She warn't particular; she could write about anything you choose to give her to write about just so it was sadful. ______ ______

5. Col. Grangerford was a gentleman, you see. He was a gentleman all over; and so was his family. He was well born, as the saying is, and that's worth as much in a man as in a horse. ______ ______

6. The old gentleman owned a lot of farms and over a hundred niggers. Sometimes a stack of people would come there, horseback, from ten or fifteen miles around, and stay five or six days, and have such junketings round about on the river, and dances and picnics in the woods daytimes, and balls at the house nights. These people was mostly kinfolks of the family. The men brought their guns with them. It was a handsome lot of quality, I tell you. ______ ______

7. There was some trouble 'bout something, and then a lawsuit to settle it; and the suit went agin one of the men, and he up and shot the man who won the suit - which he would naturally do, of course. Anybody would. ______ ______

Group 1 Group 2

8. I reckon he *warn't* a coward. Not by a blame'sight. There ain't a coward amongst them Shepherdsons -- not a one. ______ ______

9. It was pretty ornery preaching -- all about brotherly love and such-like tiresomeness; but everybody said it was a good sermon... ______ ______

10. If you notice, most folks don't go to church only when they've got to; but a hog is different. ______ ______

11. I cried a little when I was covering up Buck's face, for he was mighty good to me. ______ ______

12. You feel mighty free and easy and comfortable on a raft. ______ ______

When you are finished, if there is time, get together with two or three of your classmates and resolve the differences in your answers.

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THE MEASUREMENT OF STUDENTS' ATTITUDES TOWARD WHAT THEY STUDY

Thomas H. Estes

From college campuses to the one-room country school, educators are concerned with students' attitude toward what they study. It is education's concern that students leave school with more than facts and fixed beliefs, that they carry with them habits and attitudes which will cause them to continue to study and learn. Yet, when a system or technique is evaluated, it is usually on strictly cognitive bases. We find it difficult to assess affective behaviors such as attitudes objectively.

In connection with an experiment currently being conducted at the Reading and Language Arts Center of Syracuse University, it was necessary to develop some way to measure students' attitudes toward the content area they are studying. Specifically, the task was to develop a scale to measure ninth grade students' attitudes toward social studies. The construction of this scale is reported here in the hope that the work will be helpful to others faced with similar problems. The experience suggests that school districts could develop similar scales for their particular populations as an aid to curriculum and methodological decisions.

Sources in the Literature

The construction of this scale was based on three sources in the literature. The earliest mention of this type of scale appeared in an article by Likert (1932) and the type has since come to be known as either the "Likert scale" or the "method of summated ratings."

Basically, the Likert scale is characterized by the fact that it presents a series of statements to the respondent to which he is asked to respond on a 1-5 or 1-7 point scale, ranging from "I strongly agree" to "I strongly disagree." The statements presumably call to mind a cognitive object which acts as a referrent for the response. Likert stated in his paper that a scale of 15 such statements is sufficient to make the general factor of an attitude stand out clearly. Each response is a rating of a statement and the responses are summed across all statements to obtain a respondent's total score; hence, the title "summated ratings."

The choice of the Likert-type scale in preference to other techniques which were considered was based on a second reference, a study done by Edwards and Kenny (1946). These researchers compared the Likert and Thurstone scales, the two most frequently used. They concluded that the Likert scale is much easier to construct, requiring as little as one-half the time required for the Thurstone scale. Furthermore, the reliability of a Likert scale is as good as or better than that of a Thurstone scale, while scores on scales constructed by either technique are comparable. The favorable comparison of the Likert scale to the Thurstone scale on such criteria suggested the use of the former.

Statements from which tryout items were selected for the present scale were solicited from the social studies teachers of Jamesville-Dewitt High School, Dewitt, New York. Each teacher was given a description of the kind of scale to be constructed and was asked to contribute "statements the response toward which will reflect a certain attitude toward social studies." A third source, Edwards' (1957) *Techniques of Attitude Scale Construction*, was utilized as a handbook and is suggested by the investigator as essential. Edwards outlines fourteen criteria as guidelines for use in formulating statements to be used as scales. These were given to the social studies teachers in a slightly modified form for their use in writing statements. The response to the request was excellent: more than 100 statements were received. From those were chosen items which seemed most clearly to adhere to the listed criteria.

The tryout scale consisted of 34 items of the type described above - statements to which subjects were asked to respond on a 5-point scale. The population chosen for tryout of the items was carefully selected to be most like that on which the final scale was to be used.

Analysis in Three Stages

Analysis of the data collected on 293 subjects was conducted in three stages. In the first stage, the main intent was to compute for the total scale the mean, standard deviation, and reliability coefficient in order to assess the performance of the 34 items. The secondary intent was to choose the best items as the final scale. The criterion for selection was a correlation above +.40 between a chosen item and the total scale. This process of selection was employed in order to retain only those items which were contributing the most to the total scale.

Since each subject could rank each of the 34 items on a 1-5 scale, 1 being most positive and 5 being most negative, scores could range from 34 to 170. The sample mean on the 34 items was 84.35. The standard deviation was 15.72. The reliability, in this case the alpha coefficient of internal consistency (Cronbach, 1951) was .87. (The latter is computed with a formula which is a generalization of the Kuder-

Ricahrdson Formula 20 for dichotomous items, explained in Veldman's (1967) *Fortran Programming for the Behavioral Sciences.)*

Twenty of the original 34 items were retained to comprise the final scale on the basis of the criterion mentioned. The correlation between the retained items and the total scale ranged from +.42 to ±.63. The mean correlation of the 20 items was +.51.

The second stage of the analysis involved performing the same calculations for the final scale as had been performed for the tryout scale. The mean for the final scale was 46.56. The standard deviation was 11.17. The reliability coefficient, computed as before, remained .87.

The correlation of each of the 20 items with the total final scale yielded a set of coefficients higher than was obtained before, this presumably due to increased homogeneity of items. The coefficients ranged from +.46 to +.65, with a mean of +.54.

The third stage of the analysis of the data was performed on the 20 items of the final scale. Two hypotheses were tested, in each case with a single classification analysis of variance. They were, in their alternative form:

H_1: There will be a significant difference between sexes with regard to scores on the final scale.

H_2: There will be a significant difference between ability groups with respect to scores on the final scale.

Results of the analyses are presented in Tables 1 and 2.

Table 1

Analysis of Variance for Sexes

Source	df	MS	F
Sexes	1	47.06	0.375**
Error	291	125.43	
Total	292		

** p=0.55 (considered significant at .05 or less)

Table 2

Analysis of Variance for Ability Groups

Source	df	MS	F
Ability Groups	1	3918.88	34.950**
Error	291	112.13	
Total	292		

Note: Ability group comparison was permitted by the fact that the classes to which the scale was administered were homogeneously grouped as either "honors" or "regular" classes.

** p=0.0000 (considered significant at .05 or less)

The results of these analyses rather clearly indicate two things: 1) sexes do not differ with respect to their mean scores on this scale, 2) ability levels do differ with respect to their mean scores on this scale. The implication of Table 1 is that the scale can be administered to both males and females without considering the possibility that a student's score might be affected by his sex. Table 2 implies that if the scale is to be used for post treatment comparisons between groups, with the assumption that the groups' attitudes did not differ initially, then it will be necessary that the groups not be substantially different with respect to their mean academic ability.

It was theorized inthe third stage of analysis that if the scale were valid, then some significant relationship should exist between students' scores on the scale, teachers' ratings of students' attitude toward social studies, and students' achievement in social studies. Teachers were asked to rate each student on a 7-point scale with respect to attitude toward social studies. (A rating of 1 indicated a very positive attitude; a rating of 7 indicated a very negative attitude.) Students' scores on the SRA Achievement Test, Social Studies section, administered during June of the preceding year, were drawn from their folders. The data was then analyzed in the form of an intercorrelation analysis. The results of this analysis are presented in Table 3.

Table 3

Correlations Among Teacher Ratings, Social Studies Achievement, and Attitude Scale Scores

	r
Teacher Ratings x Social Studies Achievement	-0.40**
Teacher Ratings x Attitude Scale Scores	+0.38**
Attitude Scale Scores x Social Studies Achievement	-0.34**

Note: The negative values are explained by the fact that a low scale rating or teacher rating indicates a positive attitude.

** p .05

The analysis indicates three things: 1) all correlations are significantly different from zero, 2) high achievement tends to be associated with positive attitudes based on both teacher ratings and scores on the scale, and 3) positive teacher ratings of students' attitudes tend to be associated with positive attitudes as indicated by the scale. In general, these correlations yield evidence of the construct validity (Kerlinger, 1964) of the attitude scale.

Discussion

Certain steps which could be followed by anyone wishing to construct such a scale effectively summarize this article.

1. Solicit from a group of teachers statements the response toward which might indicate a certain attitude toward the content area being considered. Provide teachers with guidelines as presented by Edwards (1957).

2. Administer 30 to 40 of the best of these items to a large sample of students similar to those on whom the final scale will be used.

3. Compute for the total scale the mean, standard deviation, and reliability coefficient. A good reference here is the chapter on scales or scaling devices in the guide to the computer you plan to use. Veldman (1967) is a good reference also.

4. Compute a discrimination index for each item. Any value above +.40 is usually considered good.

5. After choosing the best items, repeat Steps 3 and 4 on this final scale.

6. Conduct correlations among teacher ratings of students' attitudes, students' content area achievement, and their scale scores.

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A SCALE FOR RATING THE INDIVIDUAL CHARACTERISTICS OF TEACHERS

Judith N. Thelen

One of the goals of the Demonstration Center was to observe teachers reputed to be excellent and to analyze what they were doing in class so that we might discover new methodologies to incorporate in our work with other content teachers. Locating reputedly good teachers was not a problem as each member of the team of teachers selected to work with the interns had come with this recommendation from his administration.

An initial question arose as to the criteria used in estimating a teacher's effectiveness and judging him to be excellent. Are teachers' reputations generated by observation of the faculty and administration or by student enthusiasm?

In a somewhat different vein, our classroom observations tended to support the hypothesis that teachers who are democratic, show kindness and consideration for the individual, and are patient will be rated by their students as good teachers. Research conclusions by Witty (1947), Bryan (1938), and Rosen (1968) tend to support this theory.

A second question was therefore posed: Does the teacher with the above qualities make any difference in the performance of his students? Roy Bryan (1945), Director of the Student Reaction Center at Western Michigan University, has stated that the teacher who is loved and respected will be more effective than the teacher who is hated or regarded with contempt. Cogan (1958) found that pupils will perform much more self-initiating work for teachers who are liked and respected. Hamacheck (1969) reports research by Reed (1962) indicating that pupils' interests in science are affected by teachers with a high capacity for warmth. The evidence, then, indicated that the most effective teachers are those who appear to be personable and who are best liked by students.

Our task was twofold. We needed to establish a reliable criterion on which to rate teachers with respect to individual characteristics and a criterion on which to judge teacher effectiveness with respect to influence on student learning. This paper reports our efforts with regard to the first of these.

Scale Construction - Item Selection

For the assessment of teacher characteristics the experimenter decided to use a numerical rating scale. Items for the scale were collected from the Purdue Rating Scale for Instruction, from scales standardized on different populations, and from studies of teacher characteristics (Bryan, 1938; Bryan, 1945; Ryans, 1962; Simpson and Seidman, 1962; Van Winkle, 1968).

After editing, 73 of the original items were retained. These items were selected on the basis of their specific contribution to the whole test. Table 1 shows the breakdown of categories that the 73 items represented. Personality and knowledge of subject matter were heavily weighted because previous research in this area indicates that students rate them higher than any of the other categories.

Table 1

Categories of Teacher Characteristics and Their Assigned Values for the Experimental Scale

Category	Number of Items
Purposes and goals	4
Content and resources	5
Organization and method	18
Knowledge of subject matter	16
Personality	21
Assignment and evaluation	9
Total	73

Construction of the scale followed the guidelines established by Edwards (1957). A 1-5 scale of response was used. Students were asked to indicate whether they thought a statement characteristic of the worst (1), a bad (2), an average (3), a good (4), or the best (5) teacher. The experimental test of 73 items was then administered to eleventh grade students (N=199).

Initially, completed IBM answer sheets were processed by a scanner to establish a mean and standard deviation for each item. Since the investigator wanted the completed criterion to reflect the students' concept of teacher characteristics and not the investigator's, the scale was not originally keyed. Thus, a mean which would serve as an indication of an item's value to the student could be established for each item. For example, the first item ("makes the goals of the course clear") received a total mean of 4.05. This item, then, would be considered correct when scored as a characteristic of a "good" (4) to "best" (5) teacher.

To eliminate items that would discriminate between sexes, a *t* test between male and female means was performed on each item of the scale. Only 8 of the 73 items had to be eliminated at the .05 level. These items are reprinted in Table 2. In order to dichotomize between "bad-worst" and "good-best" teachers, items that students believed to be characteristic of average teachers were also eliminated.

Table 2

Items That Discriminated Between Sexes

Item	Female Mean	Male Mean
Uses more than one textbook	3.66	3.10
Uses audio-visual devices (films, records, etc.)	4.11	3.75
Is well organized	4.26	3.99
Does not take a stand on issues	2.16	2.56
Fails to command the respect of the class	1.68	1.99
Is energetic and forceful	3.81	3.42
Welcomes differences of opinions	4.39	4.07
Makes challenging assignments	3.82	3.40

In this way, an answer key for the test was established by using the means recorded for each item as correct responses. The tests were then resubmitted to the scanner to get a total score for each student. In this revised scale, an item was considered correct if a student answered 1-2 (bad-worst) for an item with a mean range from 1.0 to 2.5 or 4-5 (good-best) for an item with a mean range of 3.5 to 5.0 depending on the key. Thus, a word (consisting of two items) could contain four possible answers. Item analysis was done manually.

Correlation of Coefficient Determined

A time saving *abac* devised by Flanagan and reprinted in Guilford's (1954) *Psychometric Methods*, using biserial correlations, was employed to estimate the relationship between each test item and total scores on the test. Only those items that contributed the most to the total scale were used. Scores on the test were placed in rank-order and the middle 46% of the examinees on total score were eliminated.

Items that received a biserial coefficient of correlation greater than or equal to .30 were considered for the final test. Edwards and Kenney (1946) recommend that this type of scale contain about 20 to 25 items. Twenty-two items were retained for the final test and can be found in Table 3 with the established (bis) value assigned to them by the students. Table 4 indicates the breakdown of categories that the 22 items represent.

It is interesting to note that students could not agree on the importance of the teacher knowing how well individual students can read. Of the students whose scores were used, 53.4% thought this knowledge characteristic of a "bad-worst" teacher, while 46.6% responded that it was characteristic of a "good-best" teacher.

Table 3

Final Teacher Rating Scale

Item	r_{bis}
Goals have practical applications for us	.30
Goals are vague at times	.30
Is not always around for consultation	.30
Occasionally stresses details	.30
Uses small group work	.35
Plans lessons well	.30
Puts a lot of time into class preparation	.30
Maintains a well-organized classroom	.40
Never has enough time to finish planned lessons	.30
Begins classes promptly	.40
Doesn't read much on subjects other than his own	.30
Rarely makes suggestions about where to get additional information	.30
Displays sympathy and understanding	.30
Is crude in expressions	.30
Avoids difficult questions which students bring up in class	.30
Has a pleasing appearance	.40
Shows definite relief when the class period is over	.30
Is clear in homework assignments	.40
Is not consistent in due-dates for assignments	.30
Gives reasonable assignments	.50
Gives feedback on homework assignments and tests	.35
Grades tests fairly	.40

Table 4

Categories of Teacher Characteristics Corresponding

To Item Numbers for the Final Scale

Category	Item number
Purposes and goals	1,5
Organization and method	2,3,4,6,7,8,9,10
Knowledge of subject matter	11,12
Personality	13,14,15,16,17
Assignment and evaluation	18,19,20,21,22,

Administration of Final Scale

A few months into the project it had become obvious that one of the teachers involved, who was also a football and basketball coach, could readily identify with and communicate with his students. With the permission of the principal and the teacher, the final scale was administered to 96 eleventh grade students who had this teacher in class. This occurred five months after the original scale had been given. The original hypothesis, that teachers who had positive and strong personalities would be rated as "good-bad" teachers by their students could now be tested.

Students were directed to respond to each item in the scale with this particular teacher in mind - indicating whether they thought the item characteristic of him. A 1-5 scale of response was used, only this time the students were directed to respond in terms of "I strongly disagree...," "I disagree...," "I am undecided...," "I agree...," or "I strongly agree that this is a characteristic of this teacher," with *1* representing strong disagreement and *5* representing strong agreement.

Scores for the 22 items could range from 22 to 110. The mean for the final scale was 81.6 and the standard deviation 11, indicating that the students rated the teacher in question as "good-best."

Results of this administration are listed by category, item mean for each category, and total category mean in Table 5.

Table 5

Characteristics of a Popular Teacher

Category	Item Mean	Total Category Mean
Purpose and Goal		
Goals have practical application for us	4.05	
Uses small group work	3.01	3.53
Organization and Method		
Goals are vague at times	3.67	
Is not always around for consultation	3.51	
Occasionally stresses details	3.84	
Plans lessons well	3.15	
Puts a lot of time into class preparation	2.74	
Maintains a well-organized classroom	3.81	
Never has enough time to finish planned lessons	3.55	
Begins classes promptly	3.64	3.49
Knowledge of Subject Matter		
Doesn't read much on subjects other than his own	4.01	
Rarely makes suggestions about where to get additional information	4.09	4.05
Personality		
Displays sympathy and understanding	4.07	
Is crude in expressions	4.00	

Table 5 - continued

Category	Item Mean	Total Category Mean
Personality		
Avoids difficult questions which students bring up in class	4.23	
Has a pleasing appearance	3.92	
Shows definite relief when the class period is over	3.83	4.01
Assignment and Evaluation		
Is clear in homework assignments	3.67	
Is not consistent in due-dates for assignments	3.29	
Gives reasonable assignments	3.75	
Giver feedback on homework assignments and tests	3.74	
Grades tests fairly	4.02	3.69

Two categories - "personality" and "assignment and evaluation"- each contained 22% of the items. Thirty-eight percent of the items composed the category "organization and methods." This latter category had been of enough importance to the students to warrant its inclusion in the final scale. Observe, however, that the mean of the "organization and methods" category for this particular teacher is 3.49, suggesting that it was not so important after all. The "purpose and goal" category narrowly misses the same mean score.

"Knowledge of subject matter" and "personality" appear to be the dominant characteristics of this teacher, as judged by his students.

Conclusions

The results of this study lead us to conclude that the students in this population *do* tend to think of a good teacher as one who possesses knowledge of his subject and a pleasing personality.

Although Ausubel and Robinson (1969) report that teacher personality characteristics have not been found to be highly correlated with effectiveness in teaching, research does support the speculation that traits associated with effective teaching are relatable to the overall motivational patterns visible in students.

In addressing ourselves to our second concern - that of judging teacher effectiveness - we must, therefore, consider motivational drives that are demonstrated in school learning and their relation to teacher personality.

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